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ABSTRACT

Although originally compiled and published for the California Library Telecommunications Project (an analysis of the telecommunications needs and opportunities for the California State Library on behalf of the state's 169 public libraries), this report also cites examples of, and proposes options for, electronic text use in public libraries throughout the country. Structured to cover several major areas of concern, this document is divided into three sections. Parts I and II are designed to serve as an overview of the field with a major emphasis on (1) the technological and organizational components of electronic text systems, and (2) the evolution of the field in the United Kingdom, France, Japan, Canada, and the United States, and the impact of current market and public policy trends on future developments. Part III projects specific roles for public libraries in the field of electronic text: as public access user sites, as information providers, and as managers of small electronic text systems. Examples are cited of libraries throughout the United States that are already active in one or more of these capacities. Finally, the conclusion to this report suggests some ways in which libraries can further clarify their options, and, if those options are attractive, become active in the field of electronic text. (JB)

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# Electronic Text Consortium

Electronic Text for Higher Education

San Diego State University, University of Wisconsin, University of Nebraska, WGBH Boston

ED259722

# VIDEOTEX:
# OPTIONS FOR LIBRARIES

Report Number Five
of the
Electronic Text Report Series

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# VIDEOTEX:
# OPTIONS FOR LIBRARIES

Report Number Five
of the
Electronic Text Report Series

Prepared by

Merrie Appleman
The Center for Communications
San Diego State University

for the

Electronic Text Consortium
and the
California State Library

An Annenberg/CPB Project

The mandate of the Annenberg/CPB Project over a 15-year period is to create innovative, quality college-level materials and to demonstrate unique applications of telecommunications technologies in higher education problems.

1984

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# FOREWORD

This report was initially compiled and published for the California Library Telecommunications Project, an analysis of telecommunications needs and opportunities for the California State Library on behalf of the state's 169 public libraries. Although originally directed at California institutions, the report cites examples and proposes options that are relevant to the nation's library community as a whole. For this reason, The Center for Communications now offers it as part of the Electronic Text Consortium's Report Series for the Annenberg/CPB Project.

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# INTRODUCTION

## The Purpose of This Report

This report is intended to provide public libraries with a road map to the rapidly changing and often confusing field of electronic text. Although electronic text is a fairly young industry, with a still uncertain future, it represents both a potential threat and a valuable opportunity for public libraries.

First, the threat: A growing number of "electronic publishers," using videotex and teletext as their tools, are sidestepping libraries and transmitting information directly to businesses, public organizations, and individuals in their homes. If these services prove successful in the market, they may become serious competitors to libraries.

Now, the opportunity: There is evidence to suggest that videotex and teletext may have significant potential to improve community outreach and enhance the quality of in-house library services. By employing videotex and teletext to extend their resources directly to the individual, libraries could reach sectors of the population that are often beyond their grasp: home-bound seniors, the disabled, families in far-flung rural communities, or even the average citizen who never thinks to go to a public library for information. These new electronic systems might be pipelines for the library's online bibliographic database and circulation system, or outlets for special databases of local informational and educational interest, designed by library staff. If public libraries were to market their information resources to electronic text system providers, they might discover a whole new stream of revenue to support the continuation of conventional library services. The public library, in short, may be in a position to define for itself a pivotal role as local information provider--the source to which residents would turn first for information about their community and their world.

Despite this attractive scenario, there remains a good deal of uncertainty about the future of library involvement in electronic text, and the fate of the videotex and teletext industries in general. Of the many electronic text trials that have taken place in the United States over the past several years, only a few have survived to become commercial services, and none can yet report a profit. Moreover, although computer applications are far from new to the public library, there has been comparatively little participation by libraries in the trials. At the same time, many libraries are, on their own initiative, launching innovative, low-budget, electronic text services.

While in most cases it is too soon to make definitive statements about the impact of the current library electronic text activities on library operations, these experiences do suggest a number of tasks, cost considerations, and possible pitfalls for libraries considering entry into the field.

## How To Use This Report

To help public libraries sort through their options in electronic text, we have structured this report to cover several major areas of concern. Parts I and II are designed to serve as an overview of the field, with a focus on the following questions:

- What are videotex and teletext? What are the technological and organizational components of electronic text systems?
- How has the field evolved to date in the United Kingdom, France, Japan, Canada, and the United States, and what impact are current market and public policy trends likely to have on future electronic text developments?

Part III projects specific roles for public libraries in the field of electronic text: as public access user sites, as information providers, and as managers of small electronic text systems. Wherever possible, we have cited examples of libraries throughout the United States that are already active in one or more of these capacities. Three clusters of issues are of particular interest here:

- For each role, what are the general requirements in terms of library personnel, training, computer hardware and software, and telecommunications?
- What kinds of administrative and financial relationships can libraries develop with system operators, cable companies, and other entities, to implement these options?
- What are the observations of librarians who have already begun to gain experience in electronic text?

Finally, the conclusion to this report suggests some ways in which libraries can further clarify their options and, if those options are attractive, become active in the field of electronic text.

## PART I: ELECTRONIC TEXT DEFINED

The development of electronic text technology has been accompanied by a barrage of new high-tech vocabulary words: "videotex," "teletext," "system operator," and "information provider," to name but a few. A clarification of this terminology, as well as a clear understanding of the components of electronic text systems, are prerequisites to library involvement in this emerging field.

For purposes of this report, electronic text is defined as the broad category of systems which transmit text and graphics to television sets, personal computers, or specially-designed terminals for individual use. Under the generic electronic text umbrella, there are two major sets of services:

- Teletext: One-way (non-interactive) electronic text, which is sent to the home over a portion of the broadcast television signal or a cable channel. Teletext systems transmit a continuous loop of digital "pages" of information. The user "grabs" the page he or she desires by pressing a command on a simple keypad, which in turn instructs a decoder attached to the TV set to translate the information into viewable form and display it on the screen. Services range widely from closed-captioning for the hearing impaired, to community events calendars, to news and other forms of information retrieval.

- Videotex: Two-way (interactive) electronic text transmitted to the home via telephone wire or coaxial cable. Interactivity is the fundamental quality which distinguishes videotex from teletext. While teletext users access pages from a repeated cycle of information, videotex users communicate with the system's database itself with the aid of a hand-held keypad or alphanumeric keyboard. This permits numerous transactional services--home banking and electronic shopping, for example--which are not possible with the one-way teletext technology.

In its purest form, electronic text is aimed at the individual user--typically, the home user. However, the terms "videotex" and "teletext" are often used to describe a whole host of systems and services outside of the home. In some cases, electronic text system operators reach consumers by placing terminals at public sites--shopping centers or libraries, for example. In other instances, electronic text serves the communications needs of closed user groups, such as private businesses or other organizations.

Central to electronic text--both one-way and two-way--is the concept of user control. Although only videotex is truly interactive, all forms of electronic text enlist the consumer's active participation. Unlike television, a purely "passive medium," electronic text is accessed at the "express command of the user."[1] Moreover, user friendliness is a key consideration in the design of electronic text systems. Neither high-level computer literacy, nor time-consuming training are prerequisites to operation of most systems. These features make electronic text services particularly suitable for use by the public at large and in a public library setting.

## Comparative Transmission Media

The medium employed to transmit electronic text determines to a considerable extent the scope and flexibility of the services offered on the system. Here it may be useful to conceptualize electronic text as a spectrum of services, each with significant variation in the breadth of the information base, the size of the potential usership, the degree of interactivity, the speed of transmission, and the costs to the system operators and users. Figure A (page 9) illustrates the standard approaches to the transmission of teletext and videotex.

Broadcast Teletext: In the broadcast mode, teletext is transmitted via the vertical blanking interval (VBI) of the television signal--the heavy black line viewers often see when their TV picture begins to scroll. The VBI was first used to provide close-captioning for the hearing-impaired. Today, it is a sought-after medium for the delivery of information to a general audience.

The chief advantage of broadcast teletext is its cost, which is lower than other transmission systems--a fact which has prompted some industry observers to predict that broadcast teletext will be among the first of the electronic text services to find a large American market. However, teletext systems work best if they carry only 75 to 100 frames, or pages, of information at a time--a significant limitation. Because the information is generated in a loop, each additional page that is included in the service adds to the length of the retrieval time--the period the user must wait while system responds to his or her request. One promising solution to this limitation is "downloading"--a process whereby the teletext signal is "loaded" into the user's personal computer for review at a later time.

Cable Teletext: If teletext is piped to users along a community cable channel, the system may transmit as many as 4,000 pages of information. But the market for cable teletext is necessarily limited to cable television subscribers--currently, only one-third of American homes. If, as some predict, national cable penetration rises to 60 percent by 1990, cable teletext will have considerably greater market potential.

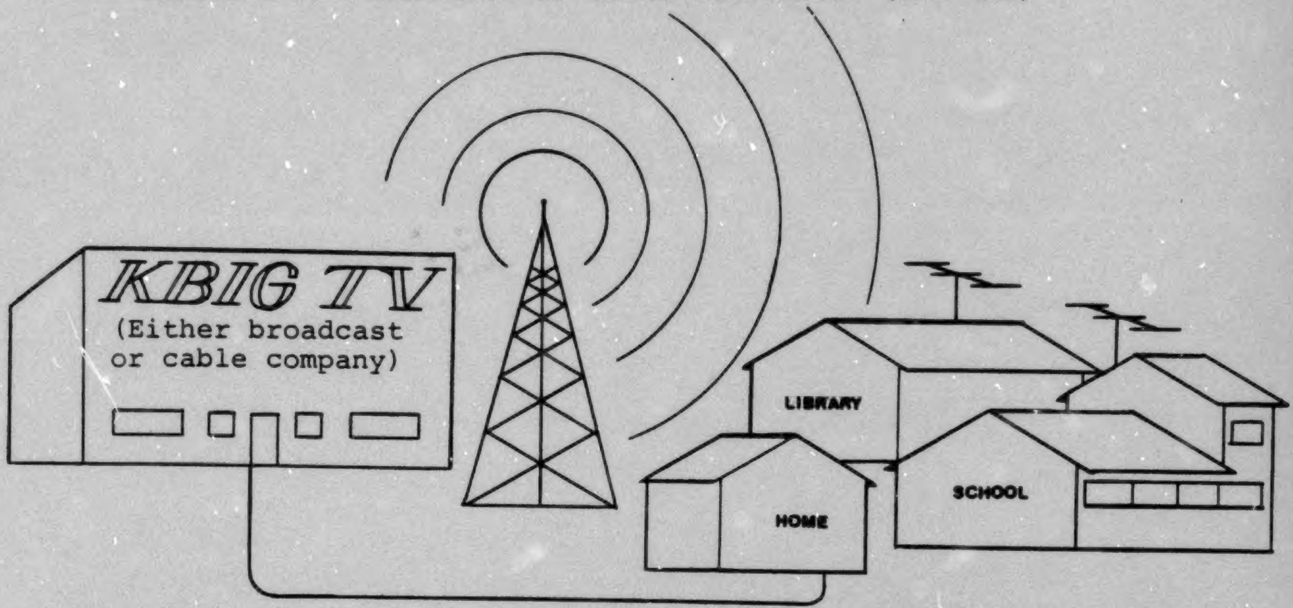
Videotex via Telephone: The telephone network is the most commonly used medium for videotex transmission, and is expected to remain so for the immediate future. Telephone circuits offer full interactivity, and because telephone service is nearly universal in the United States, much of the technical infrastructure already exists for telephone-based videotex to command a substantial national following--market conditions permitting. However, videotex via telephone can be costly: In addition to the fees the system operator charges for access to the database, videotex users must absorb telephone charges for the length of time they are on-line. Further, since each user communicates directly with the videotex database, the amount of traffic the system can tolerate at any one time is circumscribed by the processing power of the host computer. As with teletext, downloading videotex information to personal computer files is expected to emerge as a popular device for cutting telecommunications costs and reducing system traffic.

Videotex via Cable: As increasing numbers of communities acquire two-way cable systems, cable will become a highly desirable mode of transmission for videotex. Cable videotex is expected to be substantially cheaper than its telephone-based counterpart. However, far and away the majority of cable systems in the United States are non-interactive and are likely to remain so for some time. Additionally, interactive cable often has minimal "upstream capacity"; that is, the amount of information that can flow back from the user to the host computer may be limited.[2] For the library community, this suggests in some cases, cable videotex is most appropriately used for applications where a relatively limited amount of user response is necessary.

Hybrid Systems: As alternatives to the standard categories of electronic text, some "hybrid" systems are formed which combine in various ways the broadcast, telephone and cable transmission media. For example, a teletext system operator might create a mechanism for interactivity by allowing users to communicate with the host computer by touch-tone telephone. Similarly, a rather primitive "videotex" system could be developed in which the system operator sent information downstream to the users via one-way cable, and the users responded by having live telephone conversations with a designated service employee.

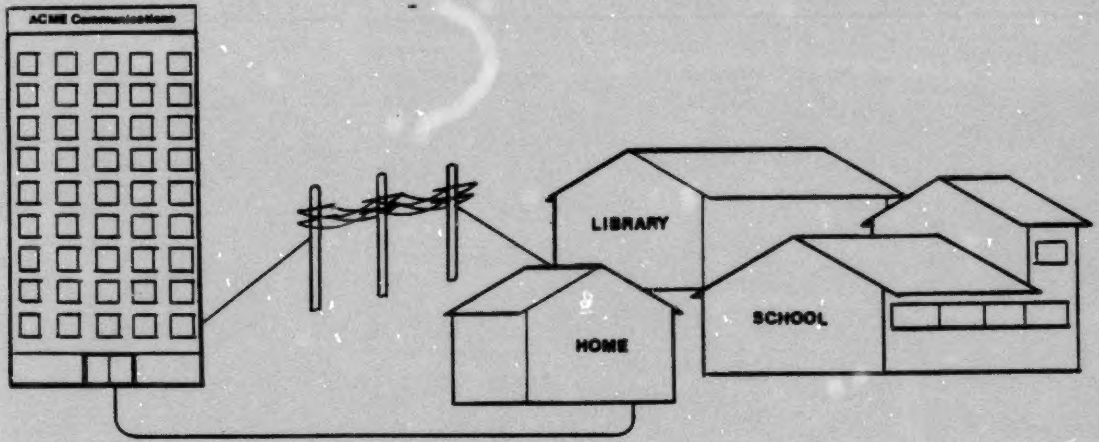
Figure A. Electronic Text Transmission Media

TELETEXT VIA BROADCAST OR CABLE TELEVISION (ONE-WAY)


KBIG TV
(Either broadcast or cable company)
LIBRARY
SCHOOL
HOME

Teletext may be transmitted to homes and other locations via the coaxial cable of the community cable television system, or it may be broadcast over the vertical blanking interval (VBI) of the television signal. In either case, special equipment is required to receive the one-way service.

VIDEOTEX VIA TELEPHONE LINES OR CABLE TELEVISION (TWO-WAY)


ACME Communications
LIBRARY
SCHOOL
HOME

Videotex is transmitted over the telephone network or two-way coaxial cable. In a hybrid system, the system operator, the system operator transmits the information to the user via cable, and the user "responds" to the system using touch-tone telephone. Special equipment is required for users to interact with the system.

## Understanding the Organizational Structure

The organizational configurations which underlay electronic text systems are perhaps best understood as a network of four overlapping functions.

Information Provider (IP): As the term suggests, the information provider is the organization or group of organizations responsible for furnishing the content of the teletext/videotex service. Specifically, this role includes:

1. Conceptualization of service and collection of data. For example, an IP charged with developing a videotex package on personal finance would select the way in which to treat the subject (the "electronic taxperson"), and then collect the appropriate materials from financial publications and institutions.

2. Formatting of information into "frame" or "page" size, which is typically much smaller than a standard document page.

3. Delivery of information to the system operator.

The above tasks can be accomplished in a number of ways. An IP wishing minimal involvement in the actual production process might simply compile information for use on the system and deliver it in hard copy form to the system operator. A more ambitious role would require the IP to input information on a computer terminal, format this information using special frame creation equipment, and transmit the completed "pages" to the system operator via some form of electronic linkage. In yet another arrangement, the IP would make a pre-existing database--i.e., a library on-line catalogue--available to the system operator using a phone port and some form of interface. These variations on the IP theme will be discussed at length in Part II below.

System Operator: The system operator performs the various management functions of the teletext/videotex service. These include operation of the host computer which indexes and stores the databases; marketing of the teletext or videotex services; and billing of the users. In cases where the IP furnishes the information exclusively in hard-copy form, the system operator is also charged with formatting the materials on a frame creation terminal.

Communications Network Provider: This is the link between the information providers, the system operator and the users of the teletext/videotex service. In many cases, more than one communications network provider is involved in a given electronic text service. The interconnection between IP databases and a videotex system operator, for example, might be accomplished with a packet-switching network or satellite arrangement, while the system operator and users might be linked by cable or telephone line.

Users: As mentioned above, the audience for electronic text varies considerably, from private industry, to government institutions, to individual subscribers in public arenas or the home. Because public libraries concern themselves primarily with the delivery of services to a general population, the individual user--and the variety of ways in which electronic text can be made publicly accessible--is the principle focus of this report.

## Understanding the Technology

Electronic text has been heralded as a new "technology," a beacon of the information age. In fact, videotex and teletext are not newly-invented technologies per se, but rather, innovative combinations of pre-existing media--a blend of telecommunications and computing. Although electronic text systems are often composed of a fairly complex set of interrelationships between system operators, host computers, remote databases and user-premise equipment, the user is rarely aware of this network configuration when he or she makes use of the service.

### User Equipment

To access teletext and videotex information, the user must have on hand three types of equipment: an input device, a decoder and a display screen.

User Input Devices: In the average teletext system the user requests specific pages of information by pressing commands on a hand-held, remote-control keypad. The keypad, consisting of numeric keys, with a few command buttons, is generally adequate for teletext purposes, since one-way services rarely require much input from the user.

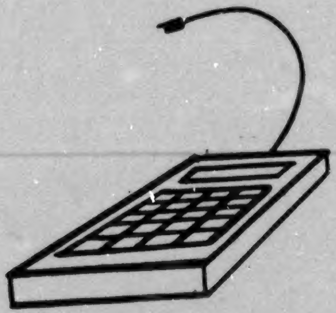


Figure B.

Keypad

Videotex systems may also rely on the keypad approach; increasingly, however, videotex operators in the United States and other parts of the world are introducing full alphanumeric keyboards as part of their services.

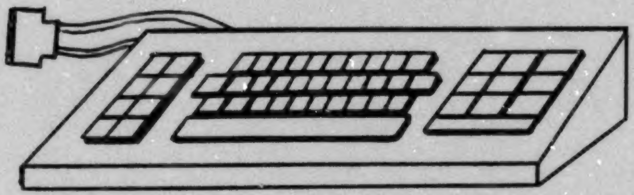


Figure C.

Alphanumeric keyboard.

This trend has been prompted by both the popularity of transactional services which require a greater degree of user input than the keypad can provide, and by the growing numbers of subscribers who are using personal computers as their link with the videotex system.

Decoders: The decoder is the instrument which translates the videotex or teletext signal into viewable form. Though decoders vary in complexity and price, all consist of at least one microprocessor and the other circuitry required to "decode" the signal.[3] In a phone-based videotex system, the decoder is accompanied by a modem to link up with the telephone network. In instances where the system is provided via cable, the decoder is wired into the community cable system.

Display Devices: Both videotex and teletext systems require some form of CRT to display the screens of information to the user. While the home TV set is frequently used for this purpose, a personal computer terminal or a terminal designed specifically for the system will work equally well. For example, AT&T is marketing dedicated videotex terminals called "Sceptre" which combine the display, decoding and input functions in one package. As an option, the standard home TV set may be used along with the Scepter decoder and input devices. The Sceptre is currently in use in videotex services in Florida and Southern California.

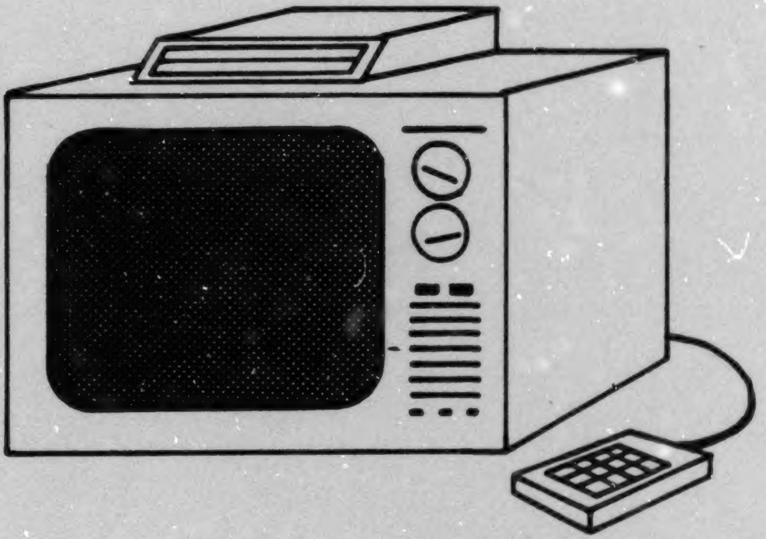


Figure D.

Standard television set with decoder and keypad.

Figure E.

Personal computer and decoder or modem. (Must be equipped to hook into the cable system, or have a modem and communications software for telephone access.)

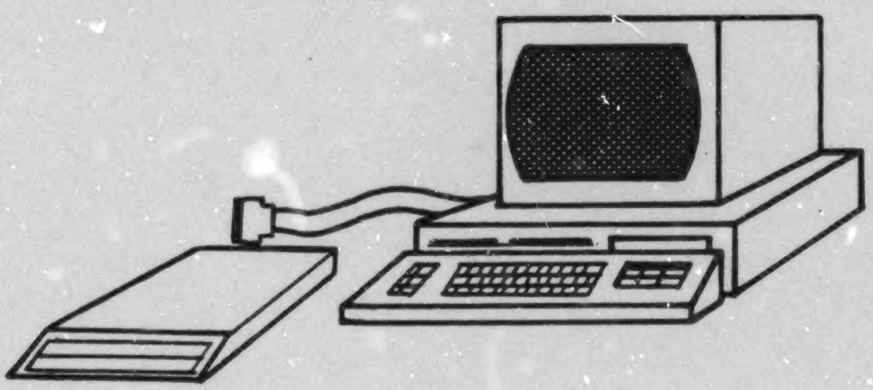
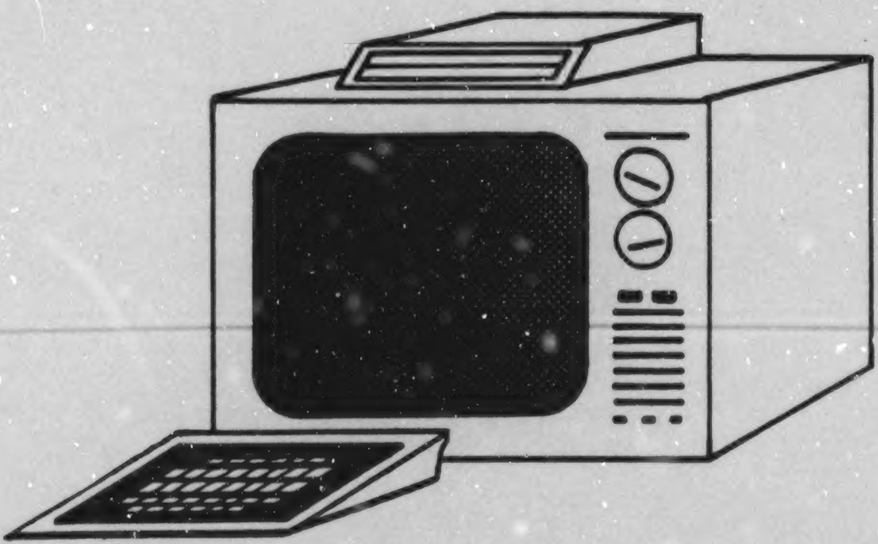


Figure F.

Dedicated terminal, consisting of standard television set, decoder, and keyboard specifically designed for a particular videotex service.



## Information Provider Equipment

The information screens which users see on their television sets or terminals are generally assembled on microcomputers with ancillary equipment and software designed to permit graphics creation, multiple page editing, and updating of the information. Components of these frame creation stations include graphics tablets, high-resolution color monitors, and disk storage capabilities.

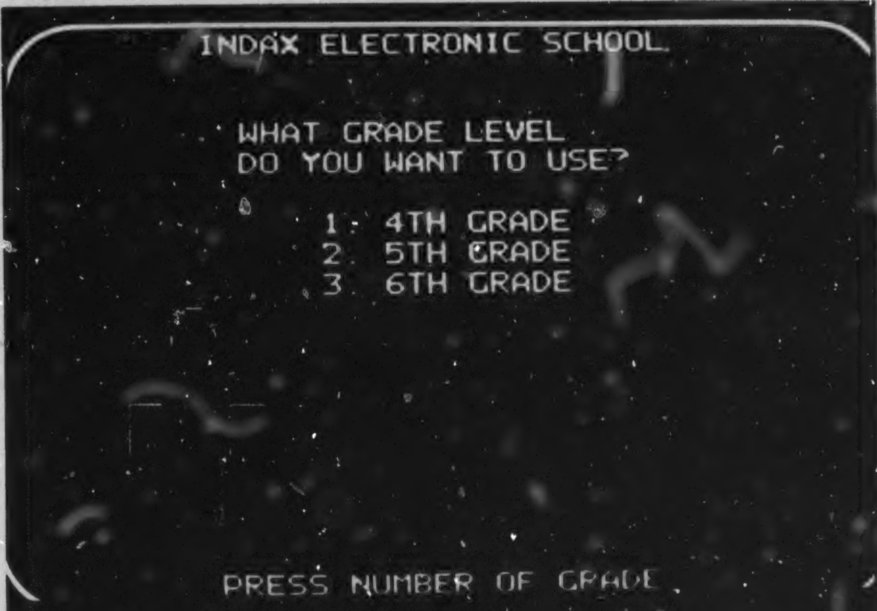
## Graphics Capablities

While many of today's electronic text systems present information in textual form only, others include color graphics in their pages of text. System operators may choose from three technologies for the presentation of graphics: alphamosaic, alphageometric, and alphaphotographic. These levels represent increasing degrees of resolution on the screen. (See Fig. G, p. 17.)

The basic difference between the three approaches is the size of the fundamental building blocks used to construct the graphics. These building blocks are called "pixels," short for "picture elements." The simplest and least expensive graphics are created with the alphamosaic technology, pioneered by the British during the early days of electronic text. Alphamosaic graphics are block-like patterns not unlike primitive mosaics. The alphageometric technology, established by Canadian researchers, uses substantial computing power to program curved lines and other geometric shapes. However, the higher resolution of alphageometric graphics comes at a considerably higher cost as well. Finally, alphaphotographic technology, like its name suggests, permits graphics of a quality that closely resembles photographs. This last approach is the least commonly used of the graphics technologies.

Figure G. Graphics Capabilities

Alphamosaic



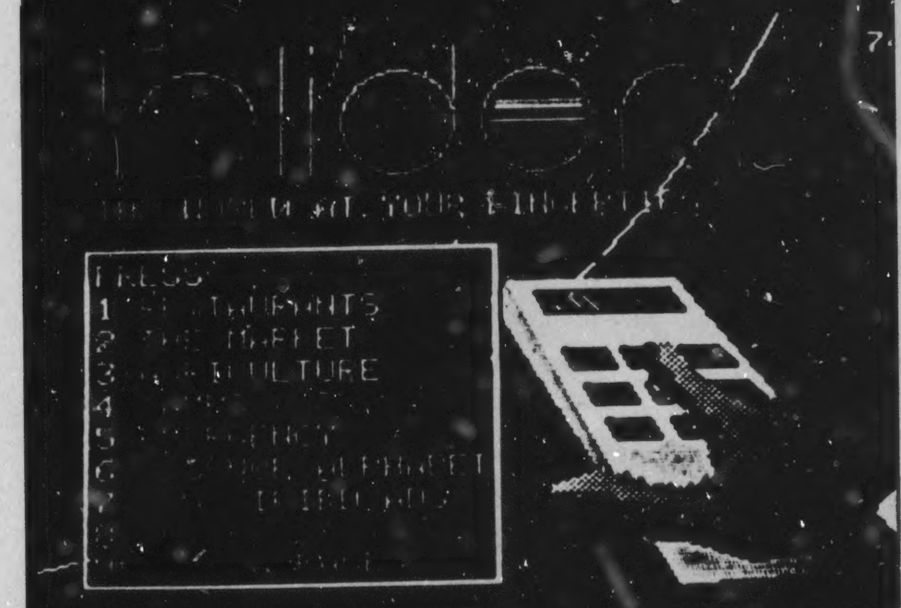
INDAX ELECTRONIC SCHOOL

WHAT GRADE LEVEL
DO YOU WANT TO USE?

1. 4TH GRADE
2. 5TH GRADE
3. 6TH GRADE

PRESS NUMBER OF GRADE

Alphageometric



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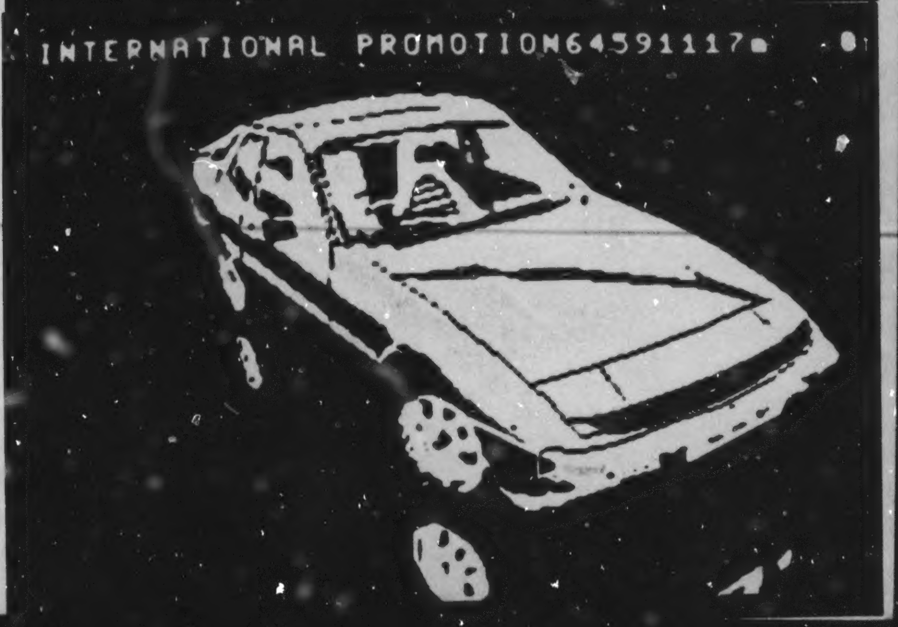
Alphaphotographic



INTERNATIONAL PROMOTION64591117

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System Architecture

Beyond the premises of the user is a web of other technological components--hardware and software--which make the electronic text service possible. A host computer--either a mainframe, or in smaller systems, a powerful micro--sits at the crux of the network. This computer may be the single storehouse of information for the service, or it may be a coordinator of several remote databases. Three types of database arrangements are currently in use.

Centralized Databases: Small videotex systems and most broadcast teletext systems with limited information services utilize a single central database. Centralizing the database in one location permits important savings--particularly in the area communications costs. But centralized databases are less effective for systems which provide transactional services or systems wishing to draw upon the resources of numerous information providers.[4]

Master/Replicated Databases: Under this arrangement, a central, or "master" database is replicated in several locations permitting large numbers of users. The users draw upon the database located closest to where they live. Information providers update the central database; the satellite databases are then updated via the communications links which interconnect them to the master computer.

External Databases: Some videotex systems create a network of several "external" databases which are linked by a packet-switching network. For example, a system which offers electronic banking services would have the database of a financial institution as part of its collection of external databases. Under this arrangement, the host computer serves as the "gateway" for these varied databases to be delivered on the same videotex system.

Database Organization: Whether the electronic text information is located in a central computer or a variety of computers, it is generally organized in a hierarchical, or "tree structure" fashion. The user thus selects the pages he or she wishes to view from an index or from a series of menus which organize the levels of the database.

Recently introduced are systems which permit keyword searching for videotex screens; this type of approach requires a good deal more computing power on the premises of the user than is necessary with the hierarchical menu method.

# PART II

## HISTORICAL OVERVIEW: THE DEVELOPMENT OF ELECTRONIC TEXT

Although electronic text has evolved as a primarily commercial medium in the United States, the technology was first applied to public-minded purposes. Both teletext and videotex have their roots in research conducted by the British Broadcasting Corporation (BBC) and the Independent Broadcasting Authority (IBA) during the 1970s. France, Japan, and the United States later followed suit with systems and standards of their own. Toward an understanding of the range of forms--technical and organizational--that electronic text systems may take, and a sense of the library community's potential role therein, it is useful to chart the international development of this precocious field.

### Electronic Text Developments Outside of the United States

#### British Electronic Text

**Teletext**: Broadcast teletext was first conceived when British engineers realized they could provide an important service for the deaf--close captioning--by transmitting textual information on the VBI. Ceefax and

Oracle, broadcast teletext services sponsored by the BBC and the IBA, respectively, were available to the public beginning in 1976. As of 1982, Ceefax and Oracle boasted of over one million subscribers.[5] Sweden, Austria, Belgium, the Netherlands, Finland and West Germany have adopted the British model to develop teletext services of their own.

For Ceefax and Oracle, the BBC and the IBA serve as IP's, system operators, and communications network providers. The service is generated from a centralized database, and displayed on standard television sets fitted with decoders. Subscribers use a numeric keypad to input their requests.[6] Because Ceefax and Oracle utilize four full lines of the vertical blanking interval, both systems respond rapidly to user requests--100 pages can be transmitted in 15 seconds. The services consist primarily of news and information--entertainment guides, news updates, and weather reports, for example. Notably, the Oracle system has become increasingly reliant on advertising revenues for its financial wherewithal.

Videotex: Videotex is the brain child of British engineer Sam Fedida, who gained fundng support from the British Post Office (BPO) and developed the first working model of the new service in 1974. The BPO began offering a public videotex service in 1976; by June, 1978, the world's first commercial videotex service, called Prestel, was in operation, and by 1982, 15,000 terminals were in place.[7] The British standard has been the blueprint for videotex trials in West Germany, Switzerland, Sweden, Finland, Norway, Austria, the Netherlands, Belgium, Italy, and, in a few cases, the United States.[8]

At the hub of the Prestel network is a centralized database which is transmitted to the user over the telephone system. Equipment on the premises of the user includes a modem, a television or other video display terminal, and a keypad or alphanumeric keyboard.[9] Software is now available to adapt personal computers to Prestel use, and it is possible to download Prestel information to individual P.C.'s.

The public Prestel system is fed by over 700 information providers--libraries and schools among them--permitting users a choice of approximately 200,000 pages of text and graphics.[10] In its early days, Prestel was essentially a one-way "mass information utility for consumers;"[11] more recently, a number of transactional services have been added. A catalog of services and access costs is provided. An additional Prestel database, for business and other closed user group applications, is also available for a flat rate or pay-as-you-go fee arrangement.

## French Electronic Text

Parallel research into electronic text occurred in France during the 1970s under the auspices of the Center for the Study of Telecommunications and Television (CCETT), which designed Antiope, a combined videotex and broadcast teletext service. In 1978, the French government issued a plan to use Antiope as the basis for a national "integrated information services network" including both teletext and videotex systems.[12]

The Antiope teletext configuration is based upon a set of regional databases rather than a single host computer--an approach that is distinctly different from the highly centralized services offered by Britain and other European nations. As in the case of British teletext, the government-sponsored broadcasting authorities act as the operators of the system. However, the information transmitted via Antiope is provided by a variety of companies and newspapers. The service places a heavy emphasis upon business information--reports on the French stock exchange, and the like. Subscribers receive a decoder and numeric pad to enable them to access the pages.

The Antiope version of videotex, called Teletel, is managed by the PTT, with information provided by a variety of organizations and distributed over the telephone system. Subscribers are connected to the system by a modem and specially-designed terminal with a full alphanumeric keyboard. Services include messaging, information retrieval, and electronic transactions. The national telephone directory has been converted to electronic page display. Other French videotex services are aimed specifically at closed user groups, especially in the business community. Commercial users, for example, pay access fees to receive continuously updated business reports.

## Canadian Electronic Text

In Canada, the development of videotex services is a joint effort of government and private industry. Beginning in 1977, the Canadian Department of Communications (DOC) funded a Prestel simulation project by Norpak, a small company specializing in the design of computer equipment. Based on this experience, the DOC Communications Research Center created Telidon, a videotex standard especially noted for its sophisticated graphics capability.

Bell Canada and the DOC gave Telidon its first public trial in 1979 with Vista, a commercial service which began with 2,000 frames and 25 terminals in Toronto, Montreal and Ottawa. The host computer, the software, and the IP and user terminals were all contributed by DOC; information provision was the responsibility of various business and non-profit organizations. A second phase of Vista was launched in 1981, with approximately 500 participants from Montreal, Toronto and Cape Rouge.

Subsequent years saw the beginning of several other important Telidon projects, both public and commercial. The Task Force on Service to the Public of the Canadian government initiated an ambitious trial featuring a large menu of public sector information--including a national job bank--which was available to users at public sites throughout Canada: post offices, shopping malls, supermarkets and libraries. A commercial Telidon venture entitled Grass Roots, sponsored by the Manitoba Telephone System and Infomart, an electronic publishing company, was launched in Manitoba to transmit weather and agriculture reports to local farmers who paid a $50.00 per month for rental of the terminal, and $.05/minute online user fees. The Ontario Educational Communication Authority (OECA) is responsible for EDUTEL, a broadcast and cable teletext magazine with 100-150 pages of supplementary course materials, job listings, and course descriptions. OECA also sponsors a 10,000 frame videotex project with career planning and guidance information for students and school counselors.[13]

Importantly, the Telidon trials have included investigation into possible library participation in the electronic text field. However, in all cases thus far, libraries have served as information providers rather than taking on the system operator role. The Calgary Public Library, for example, compiled considerable material for a database to be included in a Telidon trial conducted by the Alberta Government Telephone Company in August, 1981. The library's contribution consisted of several non-bibliographic listings:

information on library services, an "association file" of local organizations, a regularly updated announcement of new acquisitions, and demographic data about Alberta and the surrounding area.

Similarly, in 1982, the St. John's Regional Library coordinated "Project Access," a joint effort of the library and several community organizations to develop a comprehensive catalog of local public service groups.

The Faculty of Library Science at the University of Toronto, and the School of Library and Information Science at the University of Western Ontario have provided information on professional meetings and developments in the field of library science for use in a teletext trial conducted by TV Ontario--an example of how electronic text can be utilized as a tool for higher education.

## Japanese Electronic Text

Japanese exploration of electronic text during the late 1970s produced three interactive services: The Coaxial Cable information System (CCIS), the Highly Interactive Optical Video Information system (HI-OVIS), and the Video Response System (VRS). After all of these proved too costly for general use, Captain, a Prestel videotex derivative using telephone transmission, was brought onstream by the Japanese PTT. An initial public trial began in December 1979, with about 1,000 participants.

In the Captain system, a variety of organizations channel pages of information to a centralized database which is delivered to subscriber homes via telephone line. The pages are accessible on a TV set with a keypad or a terminal with a keyboard. Services range from information retrieval and educational applications, to business transactions and video games.

## Electronic Text Developments Within the United States

The electronic text industry in the United States reflects a pattern of evolution that is markedly different than its European, Japanese and Canadian counterparts. As we have seen, electronic text projects in the rest of the world have been underwritten by substantial infusions of government aid. In the United States, however, government has stayed determinedly out of the picture, preferring to let the private sector take the lead. The business community, meanwhile, has been skittish about making the necessary investments to enter a field which still lacks a proven American market. Many have opted to take a "wait-and-see" approach because of widespread uncertainty over the long term effects that the recent divestiture of AT&T will have on the shape of the telecommunications industry. Of equal controversy has been a debate over the adoption of industry-wide technical standards for videotex and teletext systems.

Technical Standards: The electronic text industry is currently the battlefield for a struggle between the British, the French, and the Canadians over the selection of a compatible technical standard--the electronic code which will make it possible for all U.S. subscribers to communicate with a system's host computer, regardless of the brand of hardware they use. A precedent for such a standard was set when, years ago, the majority of the nations in the world agreed upon the American Standard Code for Information Exchange (ASCII). The ASCII standard governs "the communication of alphabetic and numeric information," as well as basic punctuation marks. Virtually all of today's computers, software, and communications networks are in compliance with the ASCII code.

The source of the current controversy is the choice of standards for the display of graphics. For videotex, the oldest and least expensive approach is the British Prestel standard, which uses the simple, alphamosaic technique for the encoding of graphics. The Canadian Telidon standard, on the other hand, employs the alphageometric method which creates high quality, "high resolution" graphics at a significantly greater cost.[14] The British would prefer to delay a decision on this debate in the hope of continuing to market Prestel-based systems in the U.S.; the Canadians and French, on the other hand, "are eager for the U.S. to adopt one, any one, so they can begin manufacturing equipment to conform to it."[15]

AT&T, the principle player in the field, essentially forced a solution in 1982 when it announced the adoption of a Presentation Level Protocol (PLP)—a standard based largely on the Telidon approach, and considered "the most sophisticated data presentation system yet designed."[16] Although the PLP has not been officially approved as the U.S. videotex standard, its prospects look strong, since "whatever AT&T does, that becomes the standard."[17] The PLP is presently winding its way through the approval process under the name North American Presentation-Level Protocol Syntax (NAPLPS).[18]

Technical standards for American teletext have met with a similar fate. The Federal Communications Commission (FCC), normally the arbitrator in matters concerning the broadcast media, has refused to apply its rulemaking procedures to broadcast teletext. Instead, it announced in October 1982, that it would "leave technical standards of teletext up to individual licensees."[19] As a result, the U.S. teletext trials to date have been a patchwork composed of two different standards: the World System Teletext (WST), and the North American Basic Teletext Specification (NABTS).

The WST standard, based on British teletext technology, is the system used by both KEYFAX, a national teletext service carried by satellite from superstation WTBS in Atlanta, and "Electra," a local service broadcast by WKRC, Cincinnati. However, when the NBC and CBS television network planned national teletext services, each chose the NABTS approach--a "hybrid of the Telidon and Antiope systems"--as their model.[20] (See descriptions of these services below.) NABTS teletext, though sporting higher resolution graphics, has a more costly price tag to match: Decoders currently sell for between $900 and $1,000.[21] WST-standard decoders, on the other hand, are available for $300 or less.[22] As with videotex, the competition between these systems is fierce, and rife with implications for the future of the telecommunications industry.

In addition to the controversy over technical standards, several other variables are affecting the present status--and future prospects--of videotex and teletext in the United States. The direction which electronic text takes during the coming years will be the product of a number of critical factors: ongoing improvements in the technology; the public acceptance of personal computers; the emergence of industry leaders for the sale of hardware and software; the identification of information providers; the selection of appropriate fee structures; and the development of a sizeable audience for the service.

Market Trends for Teletext: With the television set a ubiquitous presence in the American home, teletext--particularly of the broadcast variety--would appear to have a significant head start on developing a national market.

However, the industry has been crippled by a major impediment--a serious shortage of the decoding devices necessary to display the teletext signal. In addition, most of the decoders currently available are quite expensive; some cost as much as $1,500. The prices are expected to drop considerably once production increases. The shortage will also be eased if General Electric, RCA and Zenith carry through with reported plans to build decoders directly into television sets for an additional cost of perhaps $50. In the meantime, one observer estimates that "there are probably fewer than 1,000 viewers/subscribers of commercial teletext services in the U.S."[23]

To push their fledgling services into the black, broadcast teletext providers intend to include advertisements on their systems. So far, however, advertisors have been reluctant to participate, possibly because of the lack of experience in designing effective ads for the medium, and a general uncertainty about the future of the industry. On the other hand, the two-way cable version of teletext will probably rely on monthly subscription fees for its support. Keyfax, for example, charges $20 per month.

One way the teletext industry hopes to expand its following is by creating more locally-orginated programming. Two of the major players in the field, CBS and NBC, have announced that stations in some of their markets will begin supplementing the pages produced by the networks with information tailored to the areas they serve.[24]

Market Trends for Videotex: In the early days of videotex, enthusiastic forecasters predicted a 10% penetration of American households by 1990.[25] As of this writing, however, only two home videotex services are operational in the entire United States: Viewtron in Florida, and Gateway in Southern California. Industry-watchers often explain this shortfall by describing videotex as a "chicken and egg" business: "You need hardware to get the service, but no one will buy the equipment until there's a service to sell, and [information] suppliers don't want to feed a signal until there's a sufficient audience with appropriate reception equipment....The situation leads to a slow-growth pattern--at least until there is a momentous dvelopment which breaks the stalemate."[26]

That necessary "momentous development" may be the personal computer. One of the barriers to market acceptance of videotex up until now has been the requirement that consumers purchase or lease costly dedicated terminals (approximately $600) in addition to paying the monthly subscription fee. But the development of low-priced modems and communications software which adapt personal computers to videotex use means that consumers no longer need to pay large sums _just_ to receive videotex. Instead, they can purchase a personal computer, modem and software for right around the same amount of money and have access not only to videotex but to the whole range of computational and word processing capabilities that a personal computer permits. The Yankee Group, a Boston research firm, predicts that 16 million to 18 million homes will have personal computers by the end of 1985.[27]

Using personal computers as videotex terminals has an additional advantage to the videotex industry, particularly in regard to transactional services like "electronic shopping." A recent innovation called "downloading" permits a portion of videotex information--the catalogue of a retailer, for example--to be "dumped" into personal computer files for storage there. Instead of having to remain connected to the host computer by telephone line or cable while browsing through the pages--a requirement which contributes significantly to the costs users must pay--the users can make their selections and then connect up with the system when they are ready to perform the actual transaction.

Thus, videotex may find its success by "piggybacking" on another technological trend.[28] By linking its future to that of the personal computer, the videotex industry increases the likelihood that its services will be enjoyed first and foremost by the more affluent members of society. This is not surprising, since the initial "adopters" of any new technology tend to be young, highly educated professionals. This presents a special challenge to public libraries and other institutions whose mandate is public service. That challenge is to provide a mechanism for general access to videotex information for those who would otherwise be excluded.

The question of advertising support is a second variable in videotex's future. Most operators have anticipated that advertising dollars, not subscription revenues, are the key to making videotex a profitable business. However, Marketing News reports that advertising agencies are wary of videotex because, they feel, it is developing as a "regional medium" with little potential to attract national advertisers.[29] There is a growing school of thought that "much of the money and effort being spent on developing videotex as an advertising medium would, at this time, be far more profitably directed towards producing and marketing the services themselves."[30]

Also worth noting is the possibility that a commonly-held assumption about videotex--the notion that a "limited number of centralized system operators would control the market"--may prove to be untrue.[31] Instead, a plurality of independent services--system operators in their own right--like the Dow Jones News Retrieval, may interconnect via gateways, giving consumers greater flexibility in the information they choose. The advent of inexpensive multi-user microcomputers may permit institutions like universities and municipal governments to launch electronic text services of their own. As Part III of this report will discuss, a day may be near when public libraries, too, will become providers of such independent information services; in fact, some instances of this already exist.

Market constraints and unforeseen developments to the contrary, numerous electronic text trials--both public and private--have been conducted in the United States since 1978. Some have moved beyond the trial stage into full-fledged commercial services. The typical organizational idiom for these projects is the joint venture, with participants drawn from a variety of sectors: cable companies, telephone carriers, newspaper publishers, broadcast stations, retailers, and banks. What follows is a snapshot of the most significant of these endeavors.

## Teletext Trials and Services

KSL-TV, Salt Lake City: The nation's first broadcast teletext service, introduced in 1978 by Bonneville International. Here the television station acted as the IP, the system operator, and the communications network provider as well. The target audience was the station's viewers in Salt Lake City. One phase of the trial involved testing the effectiveness of using a push-button phone to permit a degree of interactivity.

Keyfax: A "100-page teletext magazine" established by Field Electronic Enterprises and WFLD-TV in Chicago in April, 1981.[32] A particularly interesting component of this project involved the placement of teletext terminals called "information kiosks" in branches of the Chicago Public Library and other public sites. In addition to announcements of local events, the system featured information on library services--an effort to "deal creatively with a 36% annual increase in reference service use."[33]

Keyfax National Teletext Magazine: In 1982, Field, Honeywell and Centel corporations joined together under the name "Keycom Electronic Publishing" to market Keyfax nationally on cable as well as broadcast television. Rupert Murdoch purchased the company in 1984. The service, which had attracted approximately 500 subscribers by November 1983, uses the British display standard. Subscribers lease a British-built decoder for $10 per month in addition to a montly $10 subscription fee. The teletext signal is sent via satellite to 33 cable operators around the country. The menu includes news, sports, games and other features.

KNXT/KCET/KNBC: This consortium of Los Angeles TV stations--two commercial and one public--launched "separate but coordinated"[34] teletext trials in 1981. The services employed Antiope software and hardware. Notably, KNXT, KCET AND KNBC all served as system operators, IP's and communications network providers. All three services emphasized news and features, though the two commercial stations programmed advertisements as well.

WETA-TV, Washington, D.C.: A joint effort by this public television station and the Alternate Media Center of New York University, launched in 1981 with funds from the Corporation for Public Broadcasting, the National Science Foundation, the National Telecommunications and Information Administration, and the United States Department of Education. The project broadcast Telidon-standard teletext to 40 homes and 10 public sites (including two libraries). Services included news, weather, community information and educational materials, with the latter geared for "pre-teens, students at Gallaudet College, and citizens who use the D.C. public libraries."[35]

CBS "Extravision": A national, 24-hour, advertiser-supported service broadcast by 90% of the CBS network affiliates beginning in 1981. Updated every fifteen minutes, the service featured 100 frames of news, weather, airline schedules, classified ads, recipes and games. Extravision's success to date has been hampered by a serious shortage of decoders. As of Fall 1982, only 100 people across the country were able to receive the service.[36]

NBC Teletext: Similar to the "Extravision" concept, NBC teletext offers news, tips on personal finance, sports, weather, celebrity gossip, health and fitness information, movie reviews, soap-opera synopses and other light information--updated twice a day--to viewers of its stations. Once again, a shortage of decoders has slowed the development of the service.

Electra: A British-standard teletext service broadcast over WKRC-TV in Cincinnati and produced by the Taft Broadcasting Company. Electra has gained fame as the first local commercial teletext service in the nation. It is free to TV viewers who purchase a Zenith decoder for approximately $300. Because Zenith began producing the decoders in concert with the development of Electra, the service has not suffered from the equipment shortages that have plagued the rest of the industry.

WGBH-TV: This Boston public television station conducted an eleven month teletext trial beginning in August 1982. The 100-page service, called SCOOP, was aimed at high school and university students, patrons of the local libraries, and the general public. With this educationally-oriented audience in mind, SCOOP's menu placed a heavy emphasis on materials appropriate as supplements to school curricula, as well as news, weather and other general interest information.

WHA-TV: In conjunction with the University of Wisconsin extension program, WHA developed a service entitled Infotext, which offered agricultural information, weather reports, course announcements, and the Associated Press Newscable Wire. The station draws on the resources of several IP's for its menu.

TimeText: Time Inc.'s cable text project which served 400 homes in Orlando, Florida and San Diego, California using the North American standard (NABTS). TimeText operated 24-hours a day on a full cable channel rather than the vertical blanking interval, which permitted access to up to 5,000 frames of information. The service was discontinued early in 1984, possibly because of an overly ambitious set of services as well as the usual shortage of decoders. William L. Thomas of the Zenith Radio Corporation speculates that TimeText failed because "the average CATV customer is not conditioned to paying additional fees for information. With 24 hour a day weather, news, and sports presented in the most entertaining fashion that money will buy (the Weather Channel, CNN, CNN Headlines and ESPN), significant competition exists for any new subscription CATV service that covers the same ground."[37]

## Videotex Trials and Services

QUBE: A two-way service which Warner Amex began marketing to the subscribers of its cable systems in 1977. The service is actually a "polling response system" which allows users to register their reaction to issues raised on live video programming and game shows. Subscribers also receive a teleshopping service for ordering merchandise and a home security service.

The Source: A popular time-sharing system offered nationally by Reader's Digest to owners of personal computers. The service transmits news, financial information, electronic mail, and games to over 41,000 users via the Telenet and Tymnet packet-switched networks.

CompuServe: A time-sharing service marketed by H&R Block, with the same types of services as The Source. CompuServe, however, has attracted over 72,000 owners of personal computers nationally.

The Dow Jones News Retrieval: A subscription service, delivered over telephone lines, for businesses and home personal computer users, with an emphasis on financial information. Over 90,000 subscribers have signed up.

OCLC Channel 2000: A three-month experiment in 1981 by OCLC and Bank One of Columbus, Ohio. Two hundred Columbus homes were provided with videotex services which included a "video card catalogue" provided by the Dennison Public Library. See Part III of this report for a full description of Channel 2000 and its implications for libraries.

Green Thumb: An agricultural information service funded by The U.S. Department of Agriculture, the Kentucky Cooperative Extension Service, and the University of Kentucky between March, 1980 and July, 1981. Green Thumb provided 200 farmers in two Kentucky counties with weather information, commodity reports, 4-H club reports, and community development information. The service was delivered by phone line and stored in specially designed "Green Thumb Boxes" for viewing at the farmers' convenience.

INDAX: A two-way cable trial in 450 homes served by Cox Cable, San Diego. Transactional services--shopping, banking--as well as informational and educational services were offered for a flat rate of $5.95 per month. The trial began in 1982 and concluded in March, 1984.

Times-Mirror Videotex ("Gateway"): A commercial service initiated in early October, 1984, using telephone lines. A $30 subscription fee pays for rental of a special terminal by AT&T called Sceptre. The service includes among its information providers, the Los Angeles Times, the Washington Post, the San Francisco Chronicle, and the Minneapolis Star-Tribune. The launching of "Gateway" was preceded by a test of both telephone and cable-based Telidon technology in Palos Verdes and Mission Viejo, California during 1982. In addition to home delivery, the trial involved two public libraries as information providers. (See Part III, below.)

Pronto: Home banking and electonic mail services for customers of Chemical Bank and other banks purchasing the Pronto franchise.

San Francisco State University: For over two years, San Francisco State University has offered a 24-hour-per-day, seven-days-per-week videotex service free of charge to subscribers of the Viacom Cable System in the San Francisco region. As of April, 1984, the service reached over 84,000 subscribers. The system is transmitted over the University's dedicated cable channel; users send messages back to the host computer via touch tone telephone. Although the database is limited to 425 pages, the free service is the largest videotex system in the United States.

While the campus library does not serve directly as an information provider, the system has included a "topical listing of periodical holdings," compiled by the audio-visual staff.[38]

Viewtron: A joint venture of Knight-Ridder Publishers and AT&T in Miami, Florida, which became operational in November, 1983. The service uses the AT&T Sceptre terminal, which subscribers must purchase for $600. In addition, subscribers pay $12. each month and approximately $1. in telephone charges per hour of use. The menu of services is wide: national and local news, including pages from the Boston Globe, the Baltimore Sun, the Kansas City Star, and the Fort-Worth Star-Telegram; local Little League scores; the Grolier encyclopedia; educational programming for young people; airline guides, home banking, and teleshopping. The system hopes to attract 5,000 subscribers by the end of 1984.

Keycom: A Chicago-based commercial service scheduled for start-up in late 1984 by Field Enterprises, Centel, and Honeywell. The system expects to charge a $10/month subscription rate, plus a one-time payment of $50 for software which adapts personal computers for videotex. Users must also possess a modem.

Other services planned for the near future include California Grassroots--a news and weather service targetted for the agribusiness community in California--and a joint venture, called Trintrex, planned by CBS, Sears, and IBM.

# PART III

# THE RELEVANCE OF ELECTRONIC TEXT TO PUBLIC LIBRARIES

## Introduction

> As libraries continue to maximize diminishing resources, new techniques for library and information services will naturally evolve, requiring a more narrow focus on individual patron needs. The construct of the new library philosophy will be that central to the design of an information service is the user. It will be based on evidence that the closer the information source is to the user, the greater the impact of the information and the more beneficial it will ultimately be to him.
>
> —Edwin M. Cortez[39]

The preceding overview indicates that the electronic text industry is at an awkward stage of early development, its future promising but uncertain. But what is the significance of electronic text for California's public libraries? And how might libraries stand to gain from direct involvement in the field? The answers to these questions revolve around the library community's mandate as a public service institution, and its long-time leadership in the area of information provision and database development.

Recent years have shown a growing trend toward enhancing the accessibility of library resources to the community, through the use of outreach campaigns, interlibrary loan, bookmobiles, and on-line public access catalogues. Reductions in public funding for libraries have made it even more critical that libraries find cost-effective ways to maximize the impact of their services. One such technique--and a logical extension of existing approaches--is the delivery of library services to the home and other locations via videotex and teletext systems, and the placement of public access terminals for electronic text within libraries themselves. There are several reasons why libraries are well-suited to take on this role.

First, libraries have a long and respected track record in the field of automated information services. Large numbers of libraries now use automated systems for circulation control, electronic messaging, bibliographic searching and other applications; many have translated their public catalogues to machine readable form. In a recently published book, Kenneth Dowlin, Director of Colorado's Pikes Peak Library District describes these developments as part of an overall trend toward an "electronic library" consisting of integrated automated systems which "provide 'value added' to the data, information, or knowledge by collecting, storing, and retrieving it within a framework that guarantees and enhances access and retention, and tailors the collection to the community that the library serves."[40]

The library community's experience in this area--particularly its experience in developing and managing large information databases--could be of great use to electronic text system operators who are seeking information providers. According to Ken Jensen and A.J.S. Ball,

> Libraries have a unique contribution to make to the development process of videotex. The bibliographic networks now in operation are many times larger than any existing or planned videotex systems in terms of users and database size. Much of what has been learned in their development about file structure and indexing systems is applicable to videotex systems. The present tree structure for indexing begins to fail at an early point in the growth of videotex databases. This is not a problem if videotex is used only for ephemeral information such as stock prices, sports scores and weather reports, but it is inadequate when applied to more complex information of the sort familiar to libraries.[41]

As IP's and system operators, public libraries could make available not only the catalogue of bibliographic holdings, but also databases of their own creation--descriptions of library services, announcements of events and new acquisitions, and listings of community services, to name a few possibilities. Further, an interactive system could conceivably permit users to order books and conduct subject searches on their own, thus providing some relief to library staff.

There is a second, but equally important, factor which recommends public library involvement in electronic text. As it has been traditionally perceived, the task of the public library is to ensure that "library resources be equally available to all citizens of the community, and that the collections attempt to represent the widest possible number of viewpoints."[42] However, most evidence suggests that the coming "information explosion," including the growth of electronic text services, will be dominated by commercial concerns, with access to information tied closely to the individual's ability to pay subscription fees and purchase personal computers or other equipment. According to this view, a serious gap will exist between an "information elite"--those members of American society who enjoy access to knowlege by virtue of their income--and a growing class of "information poor." The public library thus might bear the responsibility of making available electronically transmitted information to those who would otherwise be unable to to receive it.

Libraries in the United States and elsewhere have already begun to tap the potential of electronic text. The Channel 2000 trial by OCLC, and the experiences in Britain and Canada are outstanding examples referred to earlier in this report. The Pikes Peak Public Library District, and the public libraries of Lexington, Kentucky, and Iowa City, Iowa, are currently involved in innovative projects to transmit library services to the home and public sites. In California, the Pasadena City Library and Torrance Public Library are developing databases for eventual home delivery, and libraries in Mission Viejo and Palos Verdes have been active participants in videotex trials in their areas. In San Bernardino, an electronic bulletin board system operated by the public library allows personal computer owners to ask reference questions from the comfort of their homes. These and other library electronic text activities will be elaborated upon in subsequent sections.

For the most part, however, libraries have been slow to become active in videotex/teletext developments in the United States. How might greater public library involvement occur? According to one perspective, the future of electronic delivery of library services will depend less upon the willingness of individual libraries to pioneer their own telecommunications systems and software, than upon "the ability of the librarians to work effectively with an already developing (and growing) industry."[43] This will require that libraries assert themselves in the field by developing a clear understanding of the technology, market trends, and policy developments, and by approaching industry representatives with specific proposals for library participation. Ultimately, the task will be to convince the various electronic text interests that library videotex/teletext services make good business sense, and to strike the kinds of financial and organizational relationships necessary to make such services a reality.

To begin this process, three general models for library entry into the field are outlined in the section below:

1. The library as public access user site.
2. The library as information provider.
3. The library as system operator.

These models are not intended as an all-inclusive or immutable framework (many hybrid arrangements are possible), but rather as a suggestion of some of the levels of involvement, administrative requirements, costs, and potential problems which libraries must consider in exploring the electronic text field. Within each role, regardless of the scope of the activity, is the need for designated personnel who are trained in the operation of the system or other associated tasks. These requirements, in turn, must be weighed against the attendant benefits to library users.

## The Library as Electronic Text User Site

Perhaps the simplest--and least costly--way for the library community to become involved in electronic text is as public access user sites for local or national videotex/teletext systems. In this scenario, the library would subscribe to an electronic text service, or make an arrangement whereby the system operator placed terminals in the library for public use. An alternate approach would require the library to use public and/or private funding to provide dial-up computer access to electronic text services. Patrons would thus gain hands-on experience with the new technologies, and librarians would be in a better position to judge the merits of the services before becoming more involved.

There is considerable historical precedent for the creation of "public stations" of this kind. Public sites--the salons of the eighteenth century and the drugstores of the twentieth century--provided consumers with their initial experiences in the use of two earlier communications media: the newspaper and the telephone, respectively. Today, "information kiosks" providing electronic text services are popping up throughout the nation in shopping malls and other public locations. For example, Marketing News reported late in 1983 that Ingraham Park Mall in San Antonio, Texas, has interactive, touch-sensitive terminals linking shoppers to a central database with consumer information. The "gift guide" service helps with purchasing choices based on personal data which the user inputs.[44]

Three principal schemes for the development of electronic text user sites at public libraries may be visualized.

1. The System Operator provides the electronic text service and hardware free of charge to libraries as a promotional tool.

This is a technique which the industry may turn to during these early years while the technology is gaining public acceptance. For example, New England Telephone Company plans to install a "public access videotex telephone terminal" in "a major north-eastern airport" to measure public interest in such services. The terminal, connected to a charge-a-call telephone, will allow travelers to dial-up a sampler of national and local videotex services, including information retrieval and messaging. The system will also provide access to Deafnet, a communciations service for the deaf and hearing impaired.[45]

Libraries might well be perceived as a suitable location for trials of this nature, especially if system operators felt it were advantageous from a marketing standpoint. Presumably, telecommunications charges for the time the user was online would be the library's only direct cost.

2. The Library subscribes to an electronic text service and receives the necessary hardware as part of the subscription arrangement.

For example, if the service in question were a videotex system which utilized a special dedicated terminal and decoder, the library could place such a device in the library for public use. Here the direct costs to the library would include the subscription fee, equipment purchase or rental, and associated communications costs--telephone or cable. If we use

Knight-Ridder's Viewtron system for a guide, costs would amount to $600. for purchase of the AT&T Sceptre terminal, plus $12. per month subscription fee and approximately $1.00 in telephone charges for each hour of use. Maintenance of the equipment would most likely be provided by the system operator.

If the library were interested in housing teletext services, it might use television sets already owned by the library, or secure a donation from a local merchant; direct costs to the library would then be limited to the subscription fee and rental of the decoder.

3. The Library provides dial-up access to videotex services via personal computers purchased with library funds.

Microcomputers for patron use are gaining popularity in public libraries throughout the nation, particularly as the cost of hardware and software continues to curve sharply downward. A growing number of California public libraries have purchased a microcomputer for patron use. Similarly, the public library of Columbus and Franklin County, Ohio, has Atari micros available, and Pikes Peak Library District in Colorado has become famous for its microcomputer services. Although these computers are often intended primarily for searching the public catalogue, they could easily be equipped with a modem to permit remote searching of information databases as well.[46] Costs to a library choosing this option would include the price of the hardware (the microcomputer and modem), communications software, the electronic text subscription charge, and telephone or cable service.

For any of the three scenarios described above to be successful, it is critical that the library assign and train specific staff members to be responsible for logging on and off the system, answering patrons' questions, and coordinating maintenance and other requirements. The Wheaton College Library in Wheaton, Illinois, offers a useful case study of this issue. In an 1982 article in Online, Roger Phillips describes the process he followed in setting up a "walk-up, how-do-you-do, try-me-out information service" for patron access to CompuServe, the Source, and the Dow Jones News Retrieval.[47] The Library chose a TeleVideo 950 terminal chiefly because of its price and because it featured "function keys" that would shorten the period required to log on and off. A "cast off" printer and modem from elsewhere on the college campus were obtained, and a three-tiered rolling cart was purchased from H. Wilson and Company to house the equipment. The phone was fitted with an on-off switch from Radio Shack to permit the handset to remain on the modem at all times. Finally, instruction cards were prepared to initiate users to the system.

Wheaton College Library encountered several problems in implementing the system, primarily in the area of cost. The library had decided to provide the services free of charge to students as part of its annual budget commitment. But to ensure that the costs did not become prohibitive, the access was limited to non-prime time hours--6:00 to 10:00 p.m. Monday through Friday, and 9:00 a.m. to 10:00 p.m. Saturday's. Since dial-up to the Source and CompuServe involved a toll call to Chicago, twenty-five miles away from the Wheaton College Library, a "Chicago line" was installed, significantly curbing long-distance costs. The Library placed a half-hour limit on use of the system per student, and prohibited (somewhat unsucessfully) the students from using the terminals to access video games available on the databases. Nevertheless, the response to the service was so great--nearly four times the amount that the staff had anticipated--that the budget set aside for the project was expended in less than a year. The library responded by charging $.10 for each minute of use in the hope of maintaining the service; however, once the cost recovery system was instituted, student usage became virtually non-existent.

Some additional problems encountered by the Wheaton College Library are significant to the public library community. First, some members of the reference staff were uncomfortable working with the system. The log on/log off process on the Televideo terminal was fairly lengthy, despite the use of the programmable function keys, and library staff complained that the process took too much of their time each evening. Whenever a student had difficulties operating the hardware or accessing the services, the reference librarians--many of whom were uncomfortable working with computers--were called upon to "fix" the system. Finally, some of the staff felt that the students spent too much time playing video games and checking hometown football scores, and not enough accessing information for reference purposes.

These various problems resulted in a decision by the library to discontinue the program at the end of 1983. A recent phone call to Jonathan Lauer, Head of Public Services at Wheaton College Library, revealed that the library has no plans to reinstitute a public access videotex project in the immediate future, but is considering it as a possibility in the long term.

In sharp contrast to Wheaton College's generally negative experience, two California Public Libraries report strongly positive reactions to the introduction of videotex terminals. The Miraleste branch of the Palos Verdes Public Library, and the Mission Viejo Regional Public Library were user sites for the Times-Mirror videotex experiment. Although the Telidon keyboard used in the trial was pronounced difficult to work with (the letters were arranged in an alphabetical, rather than typewriter fashion) the terminals in both libraries received heavy patron use all day long. Video games were the most popular services among young people, but news and information was also accessed frequently. Robert Conover of the Palos Verdes library says he thinks the trial increased the visibility of the library in the community. He and his staff felt "excited to be involved" with an emerging technology. Both libraries were sorry when the trial came to an end.[48]

Wheaton College Library's experience, as well as the other, more positive experiences discussed above, suggest several issues which public libraries must consider before becoming electronic text user sites:

- What will be the relationship of the library to the system operator? Will the library be a regular subscriber, or is some other sort of relationship possible? Would the system operator be willing to provide the service free of charge in return for promotional benefits? It might behoove the library to negotiate with the system operator for an arrangement beneficial to both.

- If the library opts to underwrite subscription, hardware, and communications costs, would it be advisable to institute a patron fee-for-service? In the case of Wheaton College, the fact that the service was initially offered free of charge may have caused patrons to reject the service when the library did initiate a fee. Furthermore, how would public access videotex terminals support the library's general policy of providing its services to all patrons, regardless of their ability of pay? Would coin-operated terminals be a solution?

- What other sources of funding--public and private--might be located to finance library subscription to electronic text services?

- What types of administrative/procedural arrangements can be made to limit the cost of such a service, e.g., limits on patron use during prime-time hours or special long-distance lines to cut communications expenses? If the service desired by the library is offered via interactive cable, could the library obtain free cable service by virtue of its status as a public institution? (Many franchises include provisions to that effect.) If so, this could contain expenses considerably by eliminating the factor of telecommunications costs from the cost equation.

- What kinds of staff and patron training programs could the library institute to facilitate the introduction of the new service? A few members of the staff would need to be thoroughly trained in the use of the system, and identified as the people to whom patrons could address their questions. Similarly, how should the library provide patrons with the guidelines they need for using the service? Are printed, "how to" manuals the most effective approach? Careful forethought on these training issues will minimize the interruption of regular operations, and help library staff avoid the frustrations that the Wheaton College librarians experienced.

- Who will oversee the technical maintenance of the system? Will the library perform all maintenance duties, or will this be the responsibility of the system operator?

- What services would be of greatest use to the patrons of the library?

- What effect might the placement of terminals in the library have on general library operations?

A start on answering this last question was provided by a study performed in Great Britain by Aslib, a non-profit research and development group associated with the British Library. Beginning in 1978, and continuing for 12 months, Aslib monitored use of Prestel videotex in six public libraries to evaluate staff and user response. According to Susan Spaeth Cherry,

> [the librarians] ranked Prestel's advantages in the following order: it provides up-to-date information to library patrons; it draws more people to the library; it fills gaps in existing information coverage; it provides a quick way to retrieve data; it broadens the means by which information is available, presenting it in a novel manner of interest to those turned off by books; and it has the potential to relieve staff workload.[49]

However, the librarians saw potential problems in the area of costs, crowding, and the need for staff to train new users. Fifty percent of both staff and users responded favorably to the library terminals, with one-third claiming to be "very impressed." Of particular liking to those involved in the project were the currency and rapid access of the system. Business and financial news proved the most popular of the information services, but career, travel, and local information were also widely used.[50]

## The Library as Information Provider

Many librarians feel that the most likely and most logical role for public libraries to play in the electronic text field is that of information provider (IP)--the supplier of the pages of information transmitted on electronic text systems. While libraries may not generate original information, they are by definition collectors and organizers of broad information resources. In this sense, they are well qualified to join newspapers and other organizations in marketing their services to the emerging system operators.

### Information Content

What kind of information might the library supply? According to the Atlanta-Fulton Library in Atlanta, Georgia, the answer to that question will depend to a large extent on the direction taken by the various commercial organizations that are competing for access to the information provision market. "There is no point," Atlanta-Fulton argues, "in the library competing with and duplicating services provided by private firms." It seems probable, therefore, that the library will not become a supplier of highly specialized databases, such as those for the engineering and medical fields, nor a supplier of daily news. Those responsibilities will most likely fall to commercial and educational institutions. Instead, libraries must define their niche according to the needs of the regions they serve, and the requirements of the specific electronic text systems in which they hope to participate.[51]

This last point is illustrated by the comments of Henry Heilburn, an executive involved in the nascent CBS/Sears/IBM videotex project. At the recent Videotex '84 Conference in Chicago, Heilburn said his company will use five principal criteria to evaluate potential information providers:

1. Will the information inspire regular use by subscribers?
2. Will it be consistent with the thrust and tone of the database as a whole?
3. Is videotex the most appropriate delivery mechanism for this information?
4. Is the proposed information provider the organization most qualified for the job?
5. Is the organization prepared to do a good job of formatting the information?

In short, if public libraries are to successfully compete with other commercial information providers, they must first convince the industry that the information which they have to offer will be of value to the consumer and attract system subscribers. Kevin Hegarty, Director of the Tacoma Public Library and Chair of the ALA Task Force on Videotex, warns that "the companies making a large investment in the field trials still [think] the consumer will not be prepared to pay for that information, because heretofore that information was perceived as being free."[52] The library community will acquire the clout necessary to change this perception only if it actively explores the various roles it may play and demonstrates to the industry that it intends to become a serious contestant in the market.

## Tasks Involved in the Provision of Information

Many libraries already have experience assembling files of information on local history and events, social services, and other aspects of community life. The next step would be to adapt these special files and other library resources to a form appropriate for the electronic text screen. To understand the different ways in which libraries might accomplish this, it is helpful to review the basic process used by one information provider in electronic text production. Nancy Bamberger, a videotex producer with the Center for Communications, has developed both educational and mass market videotex packages for the commercial services. In her own work, she has identified eight distinct phases:[53]

1. Conceptualize the topic(s).
2. Select the method/style of presenting the topic.
3. Determine the number of screens to be included in the package.
4. Develop a flowchart to reflect the branching structure of the program.
5. Write, design, and edit the screens on paper.
6. Input the information on a frame creation system.
7. Deliver the finished package to the system operator.
8. Update the information.

The following section offers a practical explanation of the tasks entailed in each of these phases.

1. Conceptualize the Topic(s): In consultation with the system operator, select the subject areas to be covered in the electronic text package, keeping in mind the target audience.

2. Select the Method/Style of Presenting the Topic: While many approaches are viable, some electronic text programs draw upon techniques often used by the popular press: a writing style which relies heavily on the second person ("you"), self quizzes, and "how-to" guides, with the subject matter presented in lists composed of small chunks of information. This approach is largely dictated by the screen's text capacity--typically, 50 to 75 words. It has also proven successful because it deliberately involves the user--a quality which is especially valuable in an interactive setting like

videotex. The effect is similiar to that of reading a favorite magazine.

3. Determine the Number of Screens to be Included in the Package. An average "unit" might contain between 50 and 70 screens.

4. Develop a Flowchart to Reflect the Branching Structure of the Database: The manner in which a user "navigates" a database is largely a function of the system's hardware and programming. In the simpler, consumer-oriented, electronic text systems, a database is typically hierarchical, that is, structured like an inverted tree, with the user "branching" between the various screens.

Those electronic text systems with greater interactive capabilities are more challenging to design for. The information provider not only constructs a database of information but also develops a program of branching options for the user, which goes beyond simple hierarchical branching. In developing videotex packages for Cox INDAX, which had many interactive features, Ms. Bamberger's flowcharts visually represented both database structure and computer programming.

5. Write, Design and Edit the Screens on Paper. Nancy Bamberger recommends that small IP organizations make a single person responsible for the actual writing so that a consistency of style is maintained throughout. Each screen should contain one clear, concise thought. Bamburger also advises that IP's use graphics sparingly and judiciously; research conducted at the Center for Communications and elsewhere indicates that viewers don't like graphics unless they genuinely add to the meaning of the screen.

6. Input the Information on a Frame Creation System. Once the videotex package is completed on paper, it must be translated to electronic form and organized in the database according to the flowchart. Frame creation and

database management may be the responsibility of the information provider or the system operator, depending on the arrangement. There are a large number of systems designed for this purpose. On the grandiose side, there are systems by AT&T and Norpak which run for between $38,000 to $50,000 each. Based on minicomputers, these are used by system operators and the largest of information providers. Considerably more affordable for small-scale IP's (such as libraries) are the frame creation systems based on comparatively inexpensive microcomputers, which range in cost from $5,000 to $15,000. For example: Cableshare, a Canadian corporation, markets a videotex frame creation system which runs on an IBM PC. In addition to the IPM PC, the system includes an NAPLPS videotex decoder, a software package called Picture Painter, and a "digitizing tablet"--a square, flat, table-top device with a special stylus that allows the user to "draw" multicolored graphics which then appear on a 13" color monitor. As with other micro-based frame creation systems, the graphics screens can be stored on floppy disk and transmitted directly to system operators for integration with a database and eventual distribution. Cableshare's system retails for approximately $12,500. There are, however, frame creation software packages without the decoder and digitizing tablet, which are available for much less.

7. Deliver the Finished Package to the System Operator. If the information provider is not responsible for frame creation, the materials are delivered to the system operator in hard copy form. But if the IP does take on the frame creation role, the finished screens may be stored on floppy disk and delivered by hand or transmitted via cable or telephone line directly from the frame creation terminal to the system operator's host computer. The

latter technique requires that the frame creation system have a modem and communications capability.

8. Update the Information: Again, the information provider may do this on paper, or on a computer system permitting direct editing of the screens. The Keyfax National Teletext Magazine employs ten editors to update over 1500 frames every 24 hours. However, since the type of information a library is likely to provide probably does not change as quickly as, say, news events, a much less labor-intensive updating proceedure would suffice.

## Information Provider Roles for Public Libraries

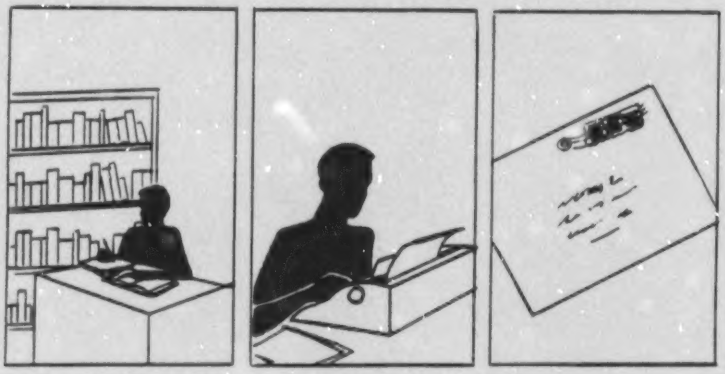
The process described above represents the basic tasks of a full-service information provider. However, it is clear that many information providers do not perform all of these responsibilities. To the contrary, the scope of the IP role may vary widely from system to system. System operators generally provide their IP's with guidelines for content development and other tasks.

A public library seeking to become an information provider could find a place within a wide spectrum of possible IP roles, depending on the resources of the library staff and the needs of the system operator:

a. Minimal IP role: Tasks might include selection of subject matter, gathering of materials, followed by a little writing and reformatting of the raw information. This would then be sent on to the system operator in hard copy form for final design and formatting into screens on the frame creation equipment. The library could perform updating as needed, again in hard copy form.

The financial, technical, and personnel requirements for the above IP role are slight. Since the materials are delivered in hard copy form, there is no need for frame creation equipment, nor for programs to train staff in their use. And because little writing or editing is required, the process would require relatively few staff members to be involved in the process. Nonetheless, at least one employee would need to be designated and trained to be the person primarily responsible for gathering information and preparing it for the system operator.

Figure H. Minimal Information Provider Role



1) Select topic; gather information.
2) Write or reformat materials.
3) Deliver to the system operator.

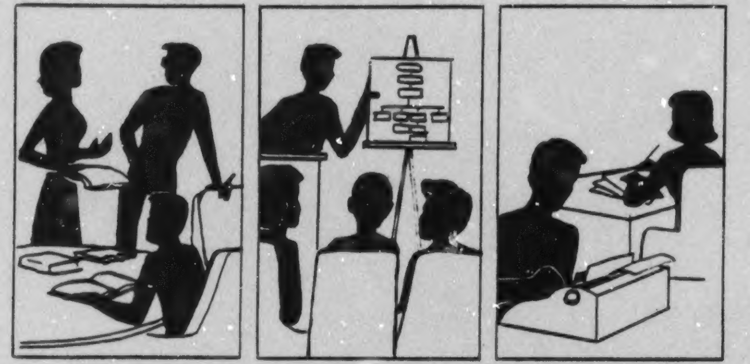
During the Times-Mirror Videotex Trial, the Palos Verdes Public Library and the Mission Viejo Regional Public Library acted as information providers on a fairly limited scale. At Palos Verdes, a clerical assistant was sent to a one-day seminar on screen design that was provided by Times-Mirror. She then prepared pages including a map of branch locations and information on library services and events. All inputting was performed by Times-Mirror staff.

The Mission Viejo Regional Public Library had a different sort of involvement as IP. Each morning, Zeph Phillips, Reference Specialist, checked the library's electronic mailbox (a feature of the videotex service) for reference questions and book requests that had been left by home videotex users the day before. In general, these were the same types of questions he normally received across his desk on any given day. He would then answer the requests, and input them in the appropriate electronic mailboxes on one of two staff terminals which Times-Mirror had provided for that purpose. Phillips says it took him between three to five minutes to input each message because of the alphabetical arrangement of the keypad.

In addition to the electronic mail service, trial participants had access to a bibliography of new and current books and the text of various children's stories for different reading levels. These last services were prepared by staff at the County library headquarters.

b. Full IP role without frame creation input responsibilities. A second, more ambitious IP role would require the library to function as a full electronic publisher up to but not including the actual input of the screens on the frame creation equipment. This would require that the library provide a producer and trained staff members to conceptualize the topic, collect information, devise a tree structure for the presentation of the materials, design and write the screens in hard copy form, and update the package on a regular basis. Again, responsibility for electronic frame creation and database management would fall to the system operator. No special equipment or telecommunications expenditures would be necessary.

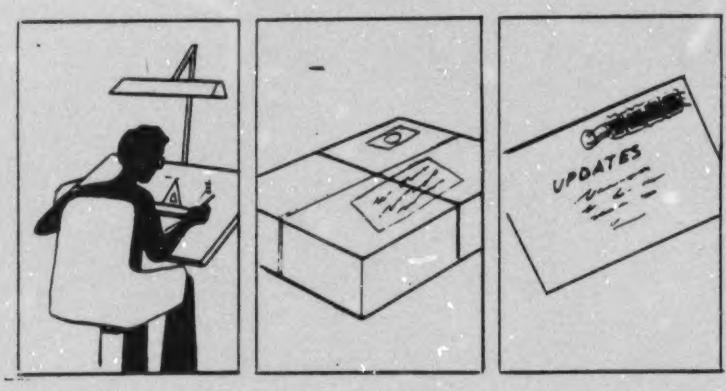
Figure I. Full Information Provider Role (Without Electronic Frame Creation Responsibilities)



1) Brainstorm; select topic; collect information.

2) Organize the topic; design a flowchart.

3) Write and format the "screens" on paper.



4) Design templates; graphics.

5) Deliver to system operator.

6) Update information as needed.

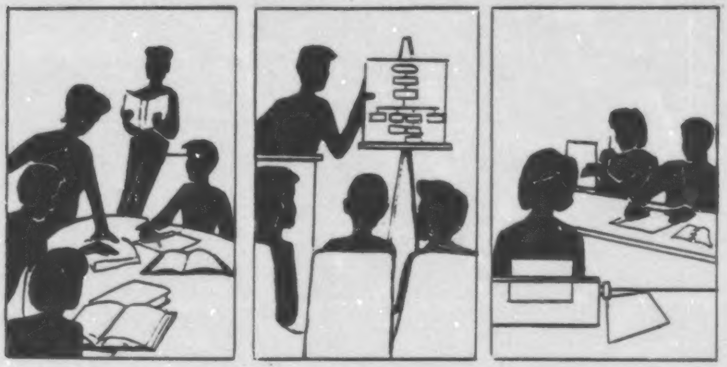
The Center for Communications at San Diego State University has served as information provider in a capacity similar to that described above.

Between July, 1982, and March, 1983, the Center was involved in a joint project with KUON-TV and the University of Nebraska to develop, implement, and evaluate several videotex packages transmitted on INDAX, Cox Cable's interactive cable system in San Diego. The Center was responsible for researching the topics, designing the format, including developing flow charts, and writing the screens for three packages: a ten-unit personal finance series, a health unit, and an investment learning game. The actual loading of the screens on frame creation equipment was performed by a graphic artist at the University of Nebraska. During a process called "debugging," both Center and Nebraska personnel would systematically review and test the package for content and branching.

c. Full IP role including frame creation and database management. Here the IP not only develops and designs content, but inputs the information on frame creation equipment and assumes responsibility for management and update of the database. Needless to say, this a considerably more costly and time-consuming proposition than the other roles mentioned above. However, the availability of less expensive, microcomputer-based frame creation systems as discussed above, is a promising sign for organizations interested in getting into this field. Libraries which already have some experience with on-line services have an advantage here over libraries which have not yet taken that step.

An IP at this level may store the screens on floppy disks and deliver them by hand or mail to the system operator, or it may transmit the information electronically to the host computer via cable or the telephone network. In this latter instance, the IP incurs telecommunications costs in addition to the costs of staff, training, supplies, and equipment.

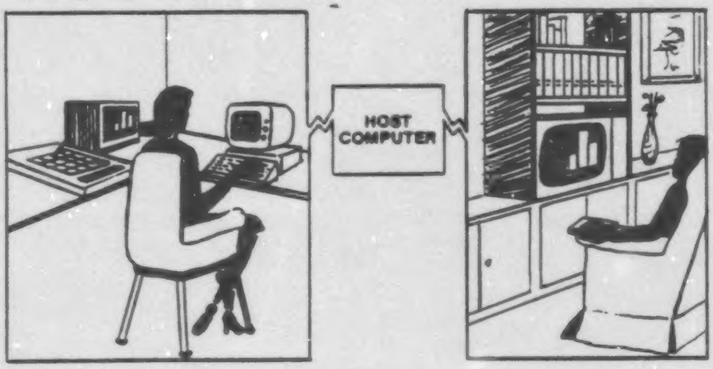
Figure J. Full Information Provider Role With Electronic Frame Creation Responsibilities



1) Brainstorm; select topic; collect information.

2) Organize the topic; design a flowchart.

3) Write and format the "screens" on paper.



4) Design screens and update information on frame creation system; transmit screens via phone line or cable to the system's host computer, which in turn sends the information to the users in their homes.

During the recent INDAX trial by Cox Cable in San Diego, Copley Press, Publisher of the San Diego Union and Tribune, acted as a principal information provider for the service. Copley maintained a large frame creation system and database on its premises and fed the videotex pages directly to Cox over the cable lines.

It stands to reason that the more the information provider involves itself in the various stages of electronic text production, the greater the costs that must be borne for supplies, equipment and trained personnel. On the other hand, the level of involvement also determines how much control the IP has over the content and design of the package that is transmitted over the electronic text system. Should electronic text establish itself as an industry, the larger IP role would also translate into larger revenues, though this connection is not yet clear. These are tradeoffs which the IP must weigh during negotiations with the system operator.

## Possible Financial and Administrative Arrangements for Library Information Providers

What financial and administrative relationships could the public library develop with a system operator such that library information could be included in the electronic text database? First, if the library's principal goal was to broaden community awareness of its activities and to extend its services to larger numbers of people, it could arrange to donate its information to the system operator, bearing the associated production and communications costs. Under this agreement, the system operator might set aside space for the library pages free of charge, or it might require the library to pay "rent" for access to the system, "as it does for a branch library in order to provide information."[54]

In a second scenario, the library would become a commercial supplier to electronic text systems, selling packages of information to the system operator. This is the avenue taken by many of the information providers today: newspaper publishers, retailers, and financial institutions.

One potentially fruitful strategy for libraries to enter the information provision field would be to associate themselves with a financial institution offering home banking services. Because of its convenience to the consumer, home banking is expected to become a popular videotex application. Moreover, a new breed of low-cost videotex systems is now being marketed to financial institutions, making home banking a much more realistic venture. One such system, created by the Micro-Peripheral Corporation, is called the "Shuttle." The host computer of the Shuttle is a micro named "Scratchpad" which can accomodate as many as 48 incoming phone calls and 16 "feeds" from information providers.

The Shuttle's principal advantage is in the area of cost. While standard videotex services may cost as much as $25 to $30 million dollars to launch, the total Shuttle system, including hardware, software, modems, easy-to-run frame creation terminals, and a printer, may be purchased for around $150,000.[55] The Shuttle service may be received on a variety of personal computers or on special terminals called "bank boxes" which run for $135 (including a keypad) or $173 (including a full alphanumeric keyboard with downloading capability). Perhaps most significantly, the makers of the Shuttle system argue that "the Shuttle can make a profit with 3,000 subscribers paying $5.00 per month and $3.00 per hour connect time."[56]

The Micro-Peripheral Corporation reports that banks in Pennsylvania and West Virginia have purchased Shuttle systems and plan to initiate home banking services in the near future. Libraries would be advised to watch for similar activities in their area and initiate negotiations for information provision as part of the videotex service.

Regardless of the type of relationship it develops with an electronic text system, the public library will probably not need to absorb all the costs of information provision alone. It is likely that foundations and other local organizations could be persuaded to contribute funds to the library for the purpose of developing public information about the community the library serves. The authors of the long range plan for the Atlanta-Fulton public library, for example, view library electronic text services as

> the type of project that can attract private funds, and in which the Library can work more closely with civic, cultural, and business organizations. Think ahead to one component of the Library databank devoted explicitly to the Atlanta area, the first place that inquirers would think of for information about local government, industry, demographics, services, and cultural resources and events.[57]

Examples of the Work of Libraries as Information Providers

Several instructive examples of library activities as information providers already exist.

- The Calgary Libraries Telidon Trial: Beginning in July, 1981 and concluding in June, 1982, the Calgary Libraries Telidon Trial was a cooperative venture of Alberta Government Telephones (AGT), Calgary Public Library, Mount Royal College, Southern Alberta Institutute of Technology (SAIT) and the University of Calgary. As Michelle Toombs of Calgary Public Library describes it

> AGT...undertook to provide at no cost eight end-user terminals, access to its PDP 11/70 computer and its inputting terminals, initial training, loading and updating of information pages, and technical assistance. The participating libraries agreed to provide the location, communication requirements and maintenance for the end-user terminals, information content, ongoing training for their own

> personnel, and participation and user feedback to AGT....Each library handled this project differently based on their perceptions of the project and the degree of support from their respective administrators.[58]

After receiving training on the frame creation inputting terminals, the Calgary Public Library assigned a staff librarian to supervise the project, and hired special clerical staff to input the information. All received training on the frame creation terminals provided by AGT. The staff prepared files on Calgary clubs and associations; daily listings of events; monthly updates of newly acquired bestsellers, videodiscs, and records; directories of local politicians; announcements of lottery winners; and a "hockey quiz" and a "Canadian book quiz."[59] Patrons wishing to access the videotex service contacted a staff member who would perform the log-on process and explain the use of the system.

The library staff found that experience on the inputting terminals taught them a great deal about the steps involved in designing pages. They concluded that a library should spend several weeks experimenting with different types of information, colors and graphics, before embarking on a field trial. Selection of information, editing, formatting to fit the frame size and tree structure, and keeping records of subject headings and file "addresses" was, they found, a time-consuming process requiring careful attention.

The user reaction to the service at the Calgary Public Library was favorable. Terminals received a great deal of use during evenings, weekends, and weekday lunch hours. Notably, the library found that a face-to-face explanation of how to work the system was considerably more effective than an instructional brochure prepared for the same purpose. Needless to say, this approach requires more involvement on the part of the staff.

Also of interest, library users found that subject searches using the tree-menu approach was an unwieldy process. However, "while the keyword search approach would provide a more direct access to information, users thought they would prefer a combination of number choices and typed words to reach information."[60] Finally, patrons preferred that graphics be used for "practical rather than decorative" applications.

o Albert Campbell Public Library--Scarsborough, Ontario: This early Telidon trial was funded jointly by the Ontario Educational Communications Authority (OECA) and Infomart, a Canadian corporation. The library lacked a computer database of its own and so was inspired to create numerous pages for the videotex database, including information on local history with graphics and maps, a list of children's activities, guides to using library collections, and lists of new acquisitions. Kevin Hegarty notes that the OECA/Infomart funding was what gave the project impetus. However, large infusions of state funding "can, at best, serve only as the temporary model for involvement by other public libraries in the United States and Canada."[61]

o The LASER Prestel Videotex Project: The London and South Eastern Library Bureau (LASER), an organization formed to "coordinate and promote the interworking of libraries and other bodies sharing similar interests in the South East United Kingdom,"[62] obtained funding from the British Library Research and Development Department, the Department of Industry, and British Telecom in 1981 to begin research into information provision for Prestel. LASER served as an "umbrella ..IP"--a broker of 25 smaller IP's who developed between five and 300 videotex frames each. With a few exceptions, LASER was responsible for inputting the information on Prestel frame creation terminals.

A principal achievement of the project was to increase interest in Prestel. At the beginning of the study, LASER placed 36 Prestel terminals in public libraries and voluntary organizations; by the end of the project in March, 1981, there were over 70 sets in public libraries, "approximately half of them being provided at the commercial rate."[63]

o OCLC's Channel 2000: The preeminent example of library videotex services in the United States is Channel 2000, an experimental project of the Online Computer Library Service and Bank One in Columbus, Ohio. During October, November, and December of 1980, 200 homes in Columbus were provided with OCLC-designed videotex decoders and keypads, and given free access to six videotex services:

--"Video Catalogue": the online catalogues of the public libraries of Columbus and Franklin Counties, and the Denison University Library. Users were able to place reserves on books and request that they be delivered by mail.

--"Video Encyclopedia": online access to the Academic American Encyclopedia.

--"Public Information": local information on social services, taxes, voting eligibility, parks and recreation activities, and employment.

--"Columbus Calendar": a listing of local events.

--"Math That Counts" and "Early Reader": educational programming for young people.

--Home Banking: a transactional service provided to half the Channel 2000 homes by Bank One; users could check their account balance and pay bills.

Based on attitude surveys administered before, during and after the test, as well as group interviews, OCLC reported the following findings:

--96% of the participants claimed to like videotex in general.

--80% said that they would pay approximately $15 per month for the service. However, most of the people who expressed strong desire for the service were "heavy library users who are young, well-educated and affluent."

--Library services ranked among the most popular on Channel 2000. Participants placed "Video Encyclopedia" at the top of their list, followed by "Video Catalogue," "Home Banking," "Public Information," "Columbus Calendar," "Math That Counts," and, finally, "Early Reader."

--82% of participants said videotex would be a worthwhile expenditure of public library tax dollars. However, during the group interviews, most felt that user fees should be charged for home delivery, while videotex services provided within the library should be free.

--46% said videotex reduced the time necessary to receive books from the library, but 34% complained that it took them too much time to access a book title or encyclopedia article on the system.[64]

## The Library As System Operator

As discussed earlier in this report, the System Operator is the manager of the electronic text service, responsible for some or all of the following tasks: indexing and maintaining the database of the host computer; coordinating the various information providers (including, in many cases, formatting the information on frame creation equipment); marketing the service to consumers; and billing the users. Typically, the system operator is a large corporation, such as Field Electronic Publishing and Knight Ridder, with millions of dollars to invest in the electronic text enterprise. Clearly, the public library community is not in the position to finance a project of that magnitude. However, there are several alternatives to the conventional model which suggest a future for libraries as the operators of small electronic text services.

To illustrate this role, the following section reviews several examples of public libraries as system operators, and as active participants in joint electronic text projects with cable companies and other entities. In all instances, responsibility for host computer operation is a key characteristic of the libraries' involvement.

### Remote Delivery of Online Public Access Catalogues in Conjunction with a Community Electronic Text Service

There has been considerable interest in recent years in the development of on-line public access catalogues (OLPAC's) which enable patrons to access the computerized database of the library's holdings and conduct subject and author/title searches on their own. Under the scenario suggested here, the library would extend the OLPAC service beyond the intramural level out to patrons at public sites and to subscribers in their homes. While indexing and database management would be performed by the library, the OLPAC would most likely be one of several external databases made available to subscribers of a videotex service by way of a "gateway" arrangement between the library hardware and that of the videotex system. (See Part I, p. 19). If the system were interactive, users could conceivably place reserves on materials and have them delivered by mail to their home. In the future, whole texts might be delivered on-line and printed on printers at the home or user site. (This latter plan is not likely to become economically feasible until demand reduces the unit costs of delivery and printing.)

There are, however, technical requirements which make this model problematic. To begin with, in order for a library's public catalogue to be linked to an outside electronic text system, an interface must be written to make the two systems compatible. Moreover, most library databases today use a tree-based indexing structure which may impose unworkable search procedures on many videotex systems. It might be possible for a cooperative group of libraries to obtain a grant to create such an interface for use in a regional electronic text system. Kevin Hegarty, Director of the Tacoma Public Library, reports that "there are commercial firms currently developing systems which provide interface, for example, between Prestel and traditional library bibliographic databases,..[and] perform such tasks as automatic re-formatting to a videotex format."[65] Meanwhile, libraries that have transferred their catalogues to machine-readable form have laid the ground work to offer their OLPAC to community electronic text systems in the future.

The Tacoma Public Library has already explored the possibility of attaching its online catalogue to a videotex system which may be launched by the Puget Sound National Bank. In 1983, the Bank conducted a market survey in which participants were asked to express their desire to receive several hypothetical banking and information services, including a "video library card catalogue" which would permit subscribers to order books for delivery by mail. On a scale of one to five, ranging from "not at all important," to "very important," the library service received a 2.4 rating--the same rating given to airline schedules, and a higher rating than was received by video games, portfolio analysis, and sports news. The various proposed banking services were rated the highest, ranging from 3.4 to 4.2..

Library Director Kevin Hegarty held discussions with Puget Sound's Vice-President for Electronic Banking regarding the technical requirements for providing the library's catalogue as part of the service. However, no details of costs, funding, or other aspects of Tacoma Public Library's potential role as information provider, were specified. Although the Bank decided against instituting the service at that time, Hegarty believes that the library is likely to eventually become involved in a similar project with Puget Sound or some other bank.

## Remote Delivery of OLPAC's and Other Information via Library-Run Electronic Text Services

In a second system operator scenario, the public library might transmit the OLPAC or other library-generated information to remote sites as part of its own, independent, electronic text service. This is likely to be the most costly and labor intensive of the library roles, since it would require a permanent staff of computer specialists and--depending on the type of information transmitted on the system--researchers and writers. However, examples of this sort of activity already exist throughout the United States, employing a number of different technologies--microcomputers, touch-sensitive terminals, one-way and two-way cable systems, and the telephone network--in a variety of combinations. Typically, the system is based on a central mini-computer or powerful micro, and accessed from terminals or microcomputers at public sites or personal computers in the home. Users may bear the telecommunications costs during the time they use the system, or the library may absorb those charges as part of a free library service.

1. Micro-Computer-Based Videotex Systems: Many of today's library electronic text services have been made possible by the appearance in the marketplace of several comparatively low-cost videotex systems. Based on a new class of multi-user microcomputers, these are basically small timesharing systems which operate as file managers for remote user populations. Many examples of such products exist. In addition to the "Shuttle" service mentioned previously (see Part III, p. 58), there is a new system by Radio Shack called the VIS (Videotex and Office Information System) which transmits data over telephone lines and standard 300-baud modems to any terminal or personal computer. The system, based on the Radio Shack Model 16B microcomputer and the TRS-80 multiplexer, allows for feeds from up to 35 information providers and can handle as many as sixteen users at a time. It retails for $21,500. A similar micro-based system, using touch-screen terminals, is now offered by Cableshare, Inc., under the name "Touch-'n-Shop," which betrays its market orientation.

Drawing upon this technology, the public library of Providence, Rhode Island, is currently operating a small videotex system, called INFORM, which was designed by a former library director primarily for in-house public access applications. The system is based on a North Star Horizon microcomputer and time-sharing software which has the capacity for up to six terminals with touch sensitive screens. CL Systems, Inc. is now "marketing INFORM to libraries as a stand-alone system as well as a cordial front-end to their public access catalogue."[66] An interface has been written to enable INFORM users to access the library catalogue on the CL System LIBS 100 minicomputer.

The Providence Public Library finds the INFORM system useful for presenting "how-to" information on library services, book reviews of recent acquisitions, and lists of current events. A secretary, supervised by the head reference librarian, is responsible for creating and updating the database. Val Urbanek of Brown University's Rockefeller Library, which is also using INFORM, writes that the system "closes the distance between users and the librarian by forcing the latter to constantly think and rethink the users' needs and questions as they begin their orientation to the library."[67] Although INFORM is exclusively an internal service at Providence Public Library, it is conceivable that with the proper software and hardware expansion it could be extended outside the library to selected user sites.

An allied, if more modest, micro-based service is the electronic Bulletin Board System (BBS), a 24-hour service which allows owners of personal computers to communicate with one another for the cost of a long distance phone-call. As of October, 1983, over 800 universities, computer clubs, businesses, and other organizations, had established free BBS services.[68]

The typical BBS system consists of a TRS-80, North Star or Apple microcomputer with several floppy disk drives, special software, and a modem which automatically answers calls from other computers. At the user's end, all that is necessary is a microcomputer, communications software, and a 300 baud modem.

BBS services can be divided into two general types:

o Public Message Systems, for posting of messages for public access. These often focus on computer and software trends, or "for sale" messages for microcomputers. It is also possible to send a message to a specific person on a public message system; the system notifies that person of the existence of the message when he or she logs on.

o Information Exchanges, which in addition to a public message system also offer free, no-copyright software which users can download into their own computers.

Bulletin board systems can accomodate only one caller at a time--a feature which limits the number of users which can access the service.

From the public library's perspective, bulletin board systems offer a way for libraries to become "system operators" on an extremely limited scale. Using equipment and software which it may have already purchased for other purposes, a library could employ a BBS to enter small amounts of the sort of information that it would include in an electronic text database--library services, and announcements of community events, for example--or to answer reference questions in a computer-to-computer mode.

The San Bernardino Public Library has already put this idea into practice. Since December, 1983, computer-owners have had the opportunity to dial up the library BBS during hours when the library is closed and ask and retrieve answers to reference questions, check listings of local events, leave messages for other users, and read about new computer software developments. According to Norma Lambson, the library's computer manager, BBS users ask the same kinds of reference questions that are asked by patrons who come to the library in person.[69]

2. Hybrid Systems Combining Cable TV and Telephone: A second way for public libraries to develop a limited electronic text operation is by transmitting micro-computer-generated information over cable television with upstream response via telephone.

One such project is in the planning stages at the Lexington, Kentucky Public Library. Pat McClintoch, Automation Librarian reports that the library took an active part in the City's cable franchise negotiations and was able to secure a dedicated library channel and an agreement that the cable company would fund an automated circulation system. In return, the library is required to make its bibliographic database available to cable subscribers in their homes.

Because the cable system is not interactive, a combination of automation and manual intervention will be necessary. The system will work like this: A Lexington cable subscriber who is interested in researching a particular subject will call up a specially-designated reference librarian at the public library. The librarian will enter the subject request on a character generator terminal which will reformat the MARC record of the various citations relating to the topic, and transmit the records to the cable headend and then out to the subscriber's home. The subscriber (still on the telephone line) can then tell the librarian which citations he/she wants, and the librarian can put the materials on hold for pick-up at the branch nearest to where the subscriber lives.

One flaw in the proposed system, McClintoch says, is that every cable subscriber watching the channel will see all of these requests; the information cannot be transmitted exclusively to specific users.

The library has no sense yet of how this project will affect library traffic or other aspects of library operations. The trial is expected to begin no later than March, 1985.

The Torrance Public Library in Torrance, California has drawn on the Lexington experience to develop a comparable home delivery project of its own. The cable RFP released in 1982 by the City Attorney's office included a requirement for a library community information database (public bibliographic catalogue plus community information), to be created and maintained by the library. The successful bidder, Group W Cable, agreed to provide $2,000. to fund an automated circulation system and remote information delivery program. The city allotted $100,000. in revenue sharing funds to cover start-up costs. On-going operational costs will be funded out of the City's library budget. The library set aside $35,000. of its public library foundation funds for the project as well. CL Systems was awarded the contract to design the circulation system and provide the computer to interface with the cable system.

As in Lexington, the service will combine one-way cable and telephone technology to permit a limited form of interactivity between the patron and the library. However, while Lexington's service will require manual intervention by a staff member, Torrance's service will operate automatically via computer. A cable subscriber will tune in to the library cable television channel, and dial a special telephone number which will put he or she in communication with a Apple IIE microcomputer at the library. By pressing specific buttons on their touch-tone telephones, the user will select a subject area from a series of menus which will appear on the home television screens. The Apple IIE will respond by telling the library's central computer to re-format the MARC records that relate to the topic the user has requested, and send them out over the cable system. The user will also receive lists of pertinent community events organizations through this same process. Torrance Public Library hopes to begin the new service in May, 1985.

Along similar lines, the New Orleans Public Library is exploring the feasibility of transmitting their bibliographic catalogue over a dedicated library channel on the cable system. Subscribers could call the library and request that citations on a certain subject be cablecast. No starting date for this service has been identified.

3. Remote Access to Library Databases via Two-Way Cable: In communities where cable companies are installing interactive systems, two-way cable provides an attractive medium for library electronic text service. In 1983, the Pasadena City Library was awarded a Library Services and Construction Act Grant "for developing a model for the delivery of services on interactive cable television."[70] A consultant began work March 1, 1984; a report describing the findings of the study will be completed in November, 1984.

The project was conceived as a result of a confluence of local events with significant implications for the future of library services:

- The conclusion of a two-year community needs analysis which showed disproportionately low usage of library services among low-income Pasadena residents.

- The prospect of a franchise agreement for a two-way cable system covering the entire city, and a dedicated library channel which would be available to subscribers as part of basic service. Construction of the system is scheduled to begin in June. The contract calls for the cable company to conduct one experiment in interactivity.

- The institution of an automated library circulation system in October, 1982.

Based on these three factors, the Library considered itself in "a unique position of being able to plan for extraordinary expansion of services due to City-wide planning for cable TV at the conclusion of a careful and comprehensve analysis of community information needs."[71]

The request for quotation by consulants listed six objectives for the LSCA-funded study:

1. "To identify at least six areas of user needs to which the library might most appropriately respond through the development of databases." Liz Bishoff, Principal Librarian for Support Services, reports that the six databases include a community calendar; information on appointed and elected officials in the area; a local business directory with lists of job opportunities; local statistics; community social service agencies; and the bibliographic database of the Pasadena Public Library. The Library hopes to make these information banks available in both Spanish and English, since a large portion of the population are bi-lingual or Spanish speaking.

2. "To develop detailed plans for implementing and maintaining the databases identified in Objective #1."

3. "To develop detailed technical requirements and plans for mounting the library-produced databases on the cable network."

4. "To explore the feasibility of interconnection with at least one adjacent library system via cable." Glendale is a likely choice, because it shares a Geac circulation system with the City of Pasadena.

5. "To identify costs and sources for funding to implement the proposed databases." The Library staff has explored alternatives for implementation of the databases, including (1) "[m]ounting on existing Geac computer which already houses the Pasadena and Glendale bibliographic database...Software for dial-up access is already in place," (2) [m]ounting on hardware supplied by the cable franchise or the nonprofit corporation; (3) [p]urchase of software

> from vendors specializing in database creation...; (4) [f]unding from City coffers, cable franchiser, community groups such as the Pasadena Foundation, further grant applications for LSCA monies or elsewhere such as Council on Library Resources, National Services Foundation, HUD, etc."

6. "To prepare a publishable article describing the scope and nature of the project."

Once this planning phase is completed, the Library expects to begin an implementation period which will extend over the next few years. By Winter, 1985, two of the six databases--the community calendar and the list of local decision makers--will be available to patrons via terminals in the City's Central Library. During the summer of 1985, the community organization and business directory databases will be implemented, and the Library will begin placing the first of fifteen terminals it expects to locate in its branch libraries.

Importantly, the databases will initially be accessed over telephone lines exclusively. The Library hopes to begin mounting the data on the community cable system beginning in the summer of 1986. However, in order to ensure access to the information by people other than cable subscribers, the Library will continue to offer the service over telephone lines as well. Results of this project promise to be of great use to public libraries throughout California.

The Iowa City Public Library has just begun a pilot project making their bibliographic database available at the City's Alternative High School and Senior Center via the institutional two-way cable network (interactive cable channels set aside specifically for public agency use). The new service is a part of the library's CLSI turnkey system which supports an OLPAC on the library premises. An Apple II Plus microcomputer provides the interface between the CLSI system and the terminals at the remote sites. The new public terminals are equipped with hand-held keypads which allow the user to conduct limited author, title, and subject searching, and check the circulation status of library holdings. However, according to librarian Connie Tiffany, the users are not permitted to place reserves on materials, because the library normally charges for that service and would have to institute some sort of remote billing procedure.

The project is a joint venture of CLSI and ATC, the Inglewood, Colorado-based company which owns the local cable system. CLSI is responsible for the software, while ATC is providing the hardware. The project has been in the planning stages for over two years; the delay may have been caused by a late start in designing the software.

The Iowa City project provides an interesting example of library initiative in the area of electronic text. It was the library that originally came up with the idea, and approached CLSI and ATC. Connie Tiffany speculates that the two organizations each had special motives for investing in the project: CLSI wanted to demonstrate to other public organizations how a system of this kind could work; the company may also have viewed it as the first step toward a large system for home videotex. ATC, competing with the phone company for the provision of telecommunications services, may have seen the project as a promotional device.

Tiffany says that libraries are normally discouraged from embarking on projects of this kind because of the difficulites in working with software and hardware vendors, and the effort required to locate funding when private industry doesn't view library services as profitable ventures.

4. Remote Access via Personal Computer to Library Databases: The Pikes Peak Library District in Colorado Springs, Colorado has a program called the "home user account" which enables individuals to access several library-produced databases from personal computers at home or at public locations, as well as on the premises of the library itself. A printed "On-Line User Guide" explains the requirements for a home user account: "a valid library card, a computer terminal device, and a 300 baud (Bell 103 compatible) modem or dataset."[72] Step-by-step instructions in the guide explain how to call up the databases, which include:

- "Inventory": The on-line public access catalogue, which may be searched by subject, author, title, Dewey Decimal number, or call number.
- The "Call" File: A directory of low-cost human services, and a list of locally-elected officials.
- "Calendar": Community events, listed by date and time.
- "Clubs"
- "Carpool": A ride-sharing program.
- "Courses": Adult education offerings.

The system does not have transactional capablity at this time. Patrons who dial up the bibliographic database must come to the library to pick up or place a hold on the materials; a program for delivery of books and periodicals by mail has not been instituted. However, over 1,000 patrons are signed up as home users and secondary schools have become especially heavy users. In addition, the library acts as a broker of COCIS (Colorado College Information Service) and GIS (Guidance Information Service) databases to which the high school and community college districts subscribe.

In California, the Palos Verdes Public Library has generated an RFP to consultants to create software for an online public access catalog which will feature between ten and twelve telephone ports for community members to dial-in from their personal computers. Users will be able to reserve books, using the system, but no books-by-mail program is planned, because of the staff time required to implement it.

Robert Conover, Director of the library, anticipates that there will be a great deal of local interest in the project: The community is the home for many aerospace and computer professionals, who are personal computer enthusiasts. Moreover, a survey conducted at the high school found that 42% of the students owned computers. The library is beginning a community fund-raising program to raise $500,000. to finance the project.

A similar activity is taking place at the the campus library of the California State University at Chico. For some time, the library has had a online public catalogue with 30 in-house terminals for patron use, based on upgraded software from their CL Systems automated circulation system. Now, the library has connected the OLPAC with the campus port selector to permit dial-up access from terminals on campus, or personal computers in sites off the campus. Users can see both bibliographic and circulation information; book reservations cannot be made. Students at Chico's remote satellite campuses can also dial the OLPAC and reserve books for delivery by mail.

The San Francisco State University library, which does not have an online public catalogue, has linked its circulation system to the campus port selector for dial-up from on and off campus. Users can do limited searching on the system. The library also plans to develop a special periodicals database which will be available as part of this service.

## The Library as Broker of Multiple Information Providers

Within the system operator model, the possibility exists for the library to act as a "broker," or coordinator of various information providers. For example, the library might invite a local social service agency--a health clinic, for example--to contribute information to the database. The library might also contract for other database services and make them available at schools and other remote sites on a subscription basis. As mentioned earlier, the Pikes Peak Library District acts as a broker for two guidance counseling databases.

## Possible Financial/Administrative Relationships for Libraries as System Operators

The development of low-cost electronic text suggests possibilities for increased cooperation among public libraries and for enhanced community outreach. A group of libraries could, for example, join together to finance the costs of purchasing a system for common use. Why not cooperate to institute a small service with terminals at selected sites targeted for potential library users who can't afford personal computers or the more expensive home information services? As libraries and other public institutions develop telecommunications networks, such as the interconnection under consideration by the Pasadena and Glendale public libraries (see above), numerous options for sharing and providing electronic text services will emerge.

# CONCLUSION

The preceeding discussion suggests that there are a number of emergent opportunities for the public library in the field of electronic text. In review, the costs and benefits of future library involvement in text services depends upon the role each library chooses.

As user sites for videotex or teletext systems, library staff will gain first-hand exposure to the technologies and their potential for enhancing--or disrupting--library operations, while providing the general public with access to the services. It is a role that is firmly in the tradition of the public library as a public service institution. Costs to the library for this activity are limited; however, as with all the roles, careful forethought in terms of staffing, training, selection of equipment, and rules governing usage are important prerequisites. As information providers, the library may consider several layers of involvement, each with attendant trade-offs between the expenditures of time and money, on the one hand, and the ability to have control over the packaging and dissemination of the information on the other. It is possible for a library to enter the information provider field on a very limited basis and then increase its activities as its resources permit.

Finally, as system operators, libraries can market an OLPAC as an external database on a community videotex system, or combine microcomputer and telecommunications technologies in a variety of ways to create small electronic text services to homes and other remote locations.

Additional roles will undoubtedly suggest themselves as libraries acquire experience. However, before embarking on any electronic text project, the libraries must compare the costs, skills, and other requirements with the resources already present in their organizations.[73] Moreover, a number of questions merit further investigation as the body of library experiences grows:

- What, in concrete terms, will be the impact of electronic text services upon traffic, staff time, and other elements of library operations? For example, although the experience thus far suggests that the placement of user terminals in the library heightens the library's profile in the community, very little documentation of this issue has occurred.
- What are the public policy implications if public libraries accrue revenues from electronic text services?
- What is the potential for labor displacement in libraries as a consequence of electronic text adoption?

Equally important, how can these models, based on the experience of a few libraries in a very young field, be translated into meaningful projects for public libraries? The key may lie in two important activities--research and inter-agency cooperation.

1. "Research": Assess Communications Needs and Opportunities. When considering involvement in electronic text, public libraries may wish to follow the example of the Pasadena City Library and others that are predicating communications planning upon an clear assessment of needs of both the staff and the patrons of the library. Needs assessment may help libraries to select the technology or combination of technologies which will be most appropriate for them.

Libraries would also be well advised to investigate the various communications resources that exist within their community. For example, what types of telecommunications systems are in use in local government? What is the current status of the city's cable franchise? Is there excess capacity on any of these systems which could be effectively used by the library? The experience of both Lexington, Kentucky, and Iowa City, Iowa demonstrate the benefits that may result when libraries actively seek out electronic text opportunities, whether by influencing franchise proceedings or approaching vendors with proposals for donations.

2. "Cooperation": Develop Partnerships with Organizations of Common Interest. Libraries may wish to establish cooperative relationships with other libraries and public sector organizations to share resources and pool information. For example, a consortium of libraries and, say, health agencies, could share developmental costs to fund a videotex database on health resources available through the library. Or two libraries with adjacent service areas might wish to explore the feasibility of some form of interconnection between their public databases, as Pasadena Public Library and Glendale Public Library are considering.

Finally, in addition to developing local telecommunications partnerships, libraries can clarify their options by tracking the evolution of electronic text services in libraries and other institutions across the nation. Although the technology of electronic text will remain volatile over the next few years, we can expect to see a growing number of applications for this technology within libraries, among libraries, and importantly, in the area of library services to the community at large.

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